

J. E. D. CLINE

THE ARK OF 1984'S FUTURE



The Elite Class and the Working Class have each formed giant corporations that are rivals yet have to work together to survive. The working class corporation, The 3Musketeers, is building a huge space carousel escalator so as to enable use of Geostationary Earth Orbit to save civilization and restore the collapsed ecosystem; but they are thwarted by the Elite's TANFL corporation. Then TANFL realizes it can take over the world by helping the 3Musketeer's achieve their dream of building cities in space, to get them off the planet; but not letting them return to their homes later.

The Ark of 1984's Future is a science fiction novel in a series by Jim Cline about efforts to rejuvenate the planet by gaining high efficiency electrical lift access to high earth orbital space resources of constant solar energy, total recycling of toxic materials, high level rocket launch facilities, and plenty of room to live; all made possible by building various space access hoop structures electro-dynamically supported by kinetic energy stored circulating within themselves.

The Ark of 1984's Future

Also in this saga series by J. E. D. Cline:

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Building Up
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Also see the author's websites:

www.kestsgeo.com
www.escalatorhi.com

The author's major blog:

www.kestsgeojedc.blogspot.com

Related published technical papers by the author:

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Forward

This was originally written in participation with the NanoWritersMonth 2005 event (nanowrimo.org), with the goal to creatively and spontaneously write a 50,000-word novel during the thirty calendar days of November. This word count was finally achieved, first year for me, during the writing of this novel.



The writing mode was to identify the significant characteristics of corporations, politics, and economic systems as I experienced them in my career life; then push those characteristics a bit to the extreme, and write the plot around that, centering around my long time technical design for a new kind of highly efficient space access, the KESTS.

The chapters are of differing length, as they are the writing done on each of the 30 days in November; and some days I got more done than others, depending on available time and inspiration of the moment.

For those with curiosity about how the transportation technology would work and the kinds of things it perhaps could enable, see the Background Technology section at the end of this book. There you will also see that the energy actually added to payload by moving it from the ground into GEO orbit is only 7.15 KWh per pound, or about 72 cents per pound at 10 cents per KWh. Lots can be done at such a price.

The Ark of 1984's Future

Chapter 1 The business game is on

The TANFL mega political corporation board room was as bland as the day's have become, Rationallo thought, impatient for the after work excitement to start. The corporation, efficiently ever guided by its namesake motto, "There Ain't No Free Lunch," had succeeded in its profit raising project by eliminating R&D expenses, and by mutual agreement of its member corporations, no innovations would happen to shift the balance of power between them. So the money that would have gone into R&D went into the salaries and pockets of the investors, sure; but that had started 2 decades ago, and so sameness was everywhere, consistency was law, predictability was maximized, few surprises happened, all the ducks were kept in a row. Yet the downside was it was boring, bland. His job was easy; even he, the eldest son of one of the founders of the TANFL Political Corporation, had to work for a living, it was the law, everybody works or get sent early to the digestion tanks, along with the other hydrocarbon waste material produced.

He mulled over the rumor that the rival mega-corporation was up to something, claiming that they would be able to provide new living-space for people,

use solar power to totally recycle trash, and be able to actually again grow food agriculturally and no longer need the digestion tanks to survive. They must be crazy to think people would believe that kind of lies. Only the TANFL Corporation could create any big project; and Rationallo knew that no such thing was even the slightest in the works.

His job was to count the virtual money that the TANFL Political Corporation made each day, and post it for membership to use to see how much money they would have extra for the day's spending among the Elite Rich.

Now it was workday's end, and he hurried to meet up with his friend Guardiano. Eager to change to doing something adventurous and not boring, the two went to the secret weekly meeting of the Leroy Brown Society. The secret auditorium was crowded, the air of excitement high in the room, as they saluted the flag and sang the National Anthem, then followed by the organization's motto song, "Bad, bad, Leroy Brown, baddest man in the whole darn town..." Everybody knew that the adventure coming up was to stage an accident to one of the rival political corporations, the "3Musketeers". That bunch were deserving of destruction, as it was rumored they even accepted employees' ideas for new products, and got them patented by the corporation, to sell as innovative products on the black market, better products than made by the member TANFL member corporations. And gave bonus to the employees who had the ideas and made them happen! All this in clear defiance of the standards set by the RichElite who were the big winners in life and therefore the ones correct. Such defiant unpatriotic lawlessness deserves to be destroyed; if the police won't do it, then the Leroy Brown Society has to do it.

The plan had been in the works for almost 2 years now. Every operation they performed must never be traced to them; that was a prime rule, and no such operation had ever yet been traceable to them. It was comforting to know that they also had sufficient judges in their control as to be able to free anyone unlucky enough to get caught; but that would be a disgrace even so. Tonight would be a big night of real action, and in the confusion Rationallo and Guardiano planned to grab an extra wife each, to be hidden away from society, the women thought to have perished with the others.

Over in the Worker's Quarter of the city, 8 million people occupied one fourth of the city's land, the other 3/4 of land was owned and occupied by the 300,000 people of the Rich Elite class.

Standing at the edge of the Worker's Quarter as if defiantly, the headquarters of the 3Musketeers political corporation stood, even owning its own building.

Artesiana was new to the workforce, barely turned 17, yet was full of eagerness for the job. She had proven her aptitude for controlling the movements of the heavy machinery that forged the steel sections of their products. And she was full of enthusiasm for the 3Musketeers Political Corporation's human resources meetings. Fondly remembering how each meeting started with a pledge of allegiance to the nation, then after shouting the 3 Musketeers' motto of "One for all, and all for one", singing "16 Tons" as the group song. She already liked most of her coworkers and especially her boss, Idealiana. Artesiana had finished, gaining 15 minutes ahead of scheduled output, and so was taking an early break, outside the building, munching down some jellybean stimulants, and waved to her boss through the window of the boss's office, just when the

Wham! happened, the roof caved in most of the building. In astonishment Artisiana saw two men smash into her boss office, grab Idealiana and her Secretary and run out with them; then that part of the building collapsed too, and all burst into flame. Artisiana hid in the bushes, realizing it all was contrived and she was in danger too; from there she saw the two men jump into a truck, shoving Idealiana and the other lady in with them, and the truck sped off. The license plate was hidden, but Artisiana noted the kind of truck and that it had an unusual holder on it, the kind used when a vehicle carries a flag in a parade. She had seen such a truck before, it had been near the front of an All-City parade, an armored vehicle carrying high mucky-mucks of the TANFL Political Corporation, the "There Ain't No Free Lunch" flag waving proudly from that flag stanchion on the truck. She slipped away from the building's ruin, collapsed and aflame, clearly it was gutted with no one left alive in it by now. Her new job gone, all her new friends gone. Except Idealiana, maybe she was still alive, but where? Carefully, she would go look, in time. Savoring the last of the jellybean stimulant candies, she resolved that there would be more such candies at break times at a new building built there again. Someday.

The 3 Musketeers Political Corporation's vehicles were multipurpose, both as delivery trucks and commute for employees. Artisiana went to her truck, which had already been loaded and was far from the building; she would have driven it that evening to deliver their manufactured goods, then drive it home for the evening. She hid in the truck until the fire trucks, ambulances and news vehicles had left, then drove it home.

The next morning, she examined the TANFL news reports, which said that a freak unavoidable accident

had happened, an out of control heavy vehicle from the TANFL side of town had smashed into the 3 Musketeers Political Corporation's main manufacturing plant and exploded, and there were no survivors. They all had long ago been forced to be self-insured, so there was no money to rebuild, the disaster had zeroed out everything. TANFL was sending condolences and big wreaths of flowers to the widows whose husbands had perished in the catastrophe; and delivered "Get out of town or else you will lose precious body parts" messages to the husbands who had lost their wives in the building's collapse. All were delivered by the most handsome confident smiling men TANFL had, that usually posed as models for clothing ads, as their primary job.

Artisiana hurried over to the home of one of her late coworkers, whose wife she knew was gone on vacation far away; and she pretended to be the wife, when the smiling well-dressed hunks came to deliver free flowers, and invite her to a "new singles" party over in TANFL land, for a free lunch to express their condolences. She agreed to go; then watched as the men next went to the neighbor's home, where a husband had lost his wife in the accident, and the guys threw rotten eggs at the house and used a megaphone to threaten to remove his precious parts if he did not leave town quickly, and left an ad where one could quickly sell one's home. This all was standard business practice, per the new rules established when TANFL took over total control of the national government; in this case, the rule was that any non-TANFL man without a mate had to be a pervert, suspect of all sorts of sexual crimes against women and children, and were to be despised, watched and feared, and given a chance, mutilated. It was a powerful political persuader; the men who had just lost their wives were now men without mates, and so became subject to the rule. And

the young widows were there ripe for the harvest by the polygamous TANFL Rich-Elite men.

Back home, Artisiana looked in her delivery truck, at the boxes of parts that were the last product of the 3Musketeers Political Corporation's former main headquarters. The boxes were marked "3 mm sliding armature segments, 1,000 each", per box. In the morning she drove the truck with its payload down to the harbor part of WoQu, and delivered them as would be usual. But when she arrived, she was greeted by the 3Musketeers workers in surprise; all was thought to have been lost. Quickly they unloaded the truck, and sent the cargo on its way express to Ecuador, they said, a most desperately needed cargo. Something was being built in Ecuador, up in the high Andes Mountains on the Equator, that could save civilization, they babbled, in gratefulness for the sliding armature segment components she had brought. Artisiana took a job they offered, with the provision she was to have a couple weeks vacation first. She was going to go looking for Idealiana, her former boss; at least give it a try. She drove home in a different truck, that was assigned as part of her new job; she had a new identity now, as all people's identity was defined by the job they did. If one lost their job and found no other, they lost their identity, thus could not buy food or anything, and so they had to go to the digestion tanks.

Food was part of Rationallo's concern on the job. His department was responsible for providing the food at the most profit for the company; and in the two decades since the TANFL political party had succeeded in taking over most of the country, great strides had been made, although with odd secondary effects. To maximize use of land resources, TANFL had declared all life forms that were not domesticated for food, to be considered parasites, and were methodically eliminated

from the world ecosystem, putting in domestic animals and plants in the newly vacated space. Profits went up, bountiful produce filled their plates. Yet unfortunately the unbalanced ecosystem then collapsed; and little remained alive except for people. Before innovation had been outlawed, enzyme processes were developed that would digest almost any biomass including that of former people, and converters then made it into standard rations for food. The Rich-Elite got product food that was well spiced and shaped; the working class got the remainder from the digestion tank labs. It had been that way for over a decade now, and all seemed stable, for indefinite balance into the future, all could remain the same.

But there was this project that had been started before TANFL took the government over, something being built by the 3Musketeer Political Corporation down in Ecuador. A real crazy idea, something about building an escalator to the geosynchronous orbit, where the riffraff hoped to build all sorts of things. Rationallo suspected that if it became operational, the stability upon which TANFL functioned, would be upset from new energy sources, new recycling processes, even places to build new homes that were not under TANFL control; an intolerable situation. Yet in his chats with his buddy Guardiano, he had learned that an even more interesting thing could be done. Let the space escalator be built, and start to be used to temporarily vacate the planet so as to be able to restore the world environment, or so they thought. Guardiano's secret plan was to let it happen; and when most people had left the planetary surface for temporary homes in GEO cities, then grab a bunch of young women, destroy the space elevator, and the world was all theirs, all of it, for free!

Chapter 2 Idealiana, one of five

Rationallo spent his lunch hour introducing himself to his latest addition to his wives. Her name was Idealiana, she said, and was a manager for 3Musketeers Politico Corporation. Smugly he pointed out her surroundings, which were a windowless solitary confinement space steeped in silence, and said she was to be his wife, one of five at this time. She would be well fed, provided great comforts, and be provided television entertainment without limit; but could have no communication with the outside world, ever, from now on. She would produce and care for babies, that is all she had to do to live in great comfort for the foreseeable future. When she stopped doing that for Rationallo, she would go to the digestion tanks, the end. Get used to it, he said, struggling and plotting won't work. And no, she would not meet his other wives, nor anyone ever from now on, except Rationallo. She would grow to crave his company, relief from solitary existence; the other wives have done so, he pointed out, matter of factly. He is not an unkind husband, he advised her; merely an efficient and logical one. That females had been grouped for breeding by a single male, is a successful pattern throughout time, even the now extinct sea mammals such as walruses and whales had done it. It is a tried and true system. The dominant males father the next generation; she will become proud to mix her genes with the soon to be owners of the whole world. He set down his attractively wrapped traditional gift for her, and left her in solitude. When she had passed her second menses here, it would be time to begin breeding.

Chapter 3 Idealiana takes on Rationallo

Idealiana was determined to escape and get back to work; the project she was working on was essential to the future, she believed. But after a thorough inspection of her living space... labels on everything told all: it was a Haremspace Model 14A Version 2; each appliance had instructions in three languages, and the daily cleaning routine was written on the walls. Plaques on the wall instructed how to prepare for all the steps of producing a baby, how to care for the baby until age 3, how to release it and get ready for creating another baby; and how to prepare for going to the digestion vat when no further babies have been produced within a specific amount of time. The place was clean but clearly had been well used by former occupants. And no indication that the former occupants left to anywhere but the vats.

Yet the place was splendid with comforts. The bed was more plush than she even knew existed; the television screen so huge that it filled a whole wall, and the food menu was more lush than any restaurant she had ever visited. Exercise equipment was everywhere, along with instructions for how much to use it, at each step of pregnancy, and before and afterwards. Clearly she was to get in good physical shape and stay that way. As long as she produced babies, that is. It brought memories of a henhouse, producing eggs for the farmer; then finally the roasting oven.

There seemed to be no means of escape. No clue as to where she was even located, other than in the RichElite part of town.

After a couple days of prowling her confined space, she began to think, that she had long postponed a relationship and creation of a family, never enough

money and too many job responsibilities. Now she began to think that here was her chance to have family, time out from work; and Rationallo was something of a handsome hunk at that. So some part of her mind settled into acceptance of her new fate, the excess of plush comforts enfolding her, and her new role in life. Albeit probably quite a bit shorter life than would have been otherwise.

And she longed for company, something besides the television screen and sound that did not know she existed. When would Rationallo come visit her? And what kind of present would he bring this time? She had little to think about, but these things.

Meanwhile, Rationallo had much to keep him busy. He was letting his new wife soak in her new world for a few weeks, it was standard technique for new acquisitions. The caper in which he and Guardiano got their breeder additions had gone perfectly; the women were listed among the casualties, and the shock to the 3Musketeer Political Corporation was intense at the loss of their flagship group, their finest leaders. And most satisfyingly to Rationallo, the rate of patent applications by the 3Musketeers Political Corp fell drastically. That will cut down on those black market new gadgets, he thought, a big win for the TANFL Political Corporation, yes.

Yet the pressure was ever on him. As a member of the Rich Elite, and in top management of TANFL, he had to keep his body in well exercised shape, a trim musculature, and the latest clothing styles ever at hand, and the practiced public knowing smile while slightly bulging his biceps and expanding his chest ever so slightly, he ever had to exude the look of a long accomplished winner. Two hours a day he performed academic studies, the pressure to learn new more was

as much a requirements as was the need to present a handsome physique. He had to perform in sports, although ritualized gaming with somewhat predetermined outcomes that still maximized the competitive stress on people, and there was still the physical stress and motions to go through quite strenuously. Then enduring the bland office and rote duties as a leader of the TANFL Political Corporation, hunting down any variation from standardization, so as to maintain the business environment to accurately predict all management moves as rigid as the gears of an old clock's movement. He looked forward to the weekly meetings of the Society, where his aggressive, creative powerful real self could be more fully expressed.

The next meeting of the Society focused, as so often, on the acting out of procedures for what happens when there was some witness to their doings, or even some member who was too horrified at what was being done to remember the long term greater goals they all were serving, that "the end justified the means." The practiced acting out of the cold and ruthless terrifying termination of the witness, or informant, brought the blood lust to Rationallo's state of mind, a balance to his being. And, of course, conditioned him to never think of betraying the Society's cause, ever in the slightest, lest those brutal cunning forces set their implacable group eye upon him.

He and the rest of the Society group members sat and drank in the multimedia real life documentary, this time of what was done to one who was not even a member, but who was aware of the Society's existence, and happened to be in the wrong place and time, saw too much , and was too smart for his own good. He had become worried that the same fate might befall him and others, so he left some sealed messages to be

read in case of his "accidental" demise on a trip. One of them was discovered by the Society. And thus his doom was sealed; yet the process done as much adventure for the members, as well as reinforcing prevention of any urge they themselves might have to not do the dirty work of the Society, when called upon. The too-smart-for-his-own-good witness had his father hastened to death, his mother remarried to one of the Society's members, the family home sold and all possessions moved to their new home, and all the items sifted to remove all trace of what had been witnessed. There they found another copy of the "In Case of..." message; his mother was hastened to her death, and robbery items placed among the few things allowed the witness as his inheritance, a frameup perfectly laid trap; gossip systems and store security networks spread fearsome attributes to him, had alerts posted with the guy's picture, as a potentially dangerous suspect to be watched in every store constantly. Abuse reports were placed on record, that the guy was a molester, and every action he took to find a mate was to be feared and reported. The Society obtained an injection tracking tag removed from a real abuser predator's cadaver, and had it injected into the witness without his understanding. The documentation from constant surveillance, even in his tiny apartment, showed his bewildered slow crush, on and on. With no reason he could see, attractive women shrank from his touch and looked wide eyed fearfully at him; in every store, the security people were ever nearby obviously watching narrow-eyed, and the other customers fled, fearing involvement; so shopping itself became quite uncomfortable. No woman would have him, no friend was there in time of need, desolation was his life, and it all made no sense to him and no one would tell him what was happening.

How powerful, how pervasively unopposable, the Leroy Brown Society was! The audience pride and power was thick as they would raise their fists and gruffly chant Die! Die! at the image of the Enemy shown on screen. After that movie, a series of video clips of the still-alive "Enemies of the Leroy Brown Society and Nation" were projected on screen, and to each image of a person, the thousands of members would raise their fists and feel hatred while they shouted "Rat Fink Die, Die!" at the person's image... tests had shown that in some strange way, when that was done, the far-away real person could be observed to act oddly, even have accidents at that instant. The mysterious yet ever provable efficient Radionics devices at Society's headquarters, had the DNA "witness" obtained from each of the Society's "enemies" and the remote-acting devices were set not to heal, as they were originally designed to do; but instead set to disrupt the person, such as "sending" castrate life patterns at their targets, further preventing the enemy from forming new love relationships with people who then might be at risk of really getting to know the person.

Rationallo left the weekly meeting feeling powerful, even deliberately aware of his powerful physical muscles rippling as he sauntered out, he an in-group member of this great group... yet, something also felt uneasy, what was it? No matter. But Guardiano smiled confidently even more than ever, saying something about justice being served against those who would break traditions that were sacred.

Idealiana had her two menses finally, and eagerly awaited lovemaking at long last, get on with making family. She had seen no physical human for over two months; and so when the door opened, her joy was surprisingly intense. Rationallo strutted in, smiling confidently, flexing his biceps so casually in his clothes

model pose to excite her. And it worked, her eagerness washed over her with her lovemaking dreams pasted over the physical image of Rationallo, how handsome he was, what a great mate he was. Looking deeply into her eyes, in a smile, he placed the wrapped gift in front of her, turned and left, shutting the door.

Idealiana stopped breathing a moment, in shock, surprise, dismay. Then she looked at the especially beautifully wrapped gift he had given her. Was it a wedding ring? She opened it with almost reverence. But when she opened the box inside, she only found a semen injector for artificial insemination, with instructions in three languages. And a battery-powered vibrator, enough for one hours' stimulation to enjoy. It was to be used along with an X-rated movie by Rationallo for his wives's use, during artificial insemination and whenever else they wanted. He did not want them to be lonely. The Rich Elite men risked no disease from their many women; only one was lover. Idealiana almost threw the injector into the trash, before she remembered what happened when a wife did not produce babies. She was not ready yet for the digestion vats. Imagination soared; and baby came.

Artisiana enjoyed her new job as a longshoreman at the port facility of 3Musketeers Political Corporation. She was adept at remotely handling heavy machinery that moved cargo on and off the freighters. That she was the lone survivor of the disaster to the main headquarters was unspoken, for her safety. Yet her role posing as the widow of one of the building's casualties, had to be filled too; the real widow staying in Europe. Artisiana's new double life just added more spice to her life, she felt. Occasionally she would attend the parties for single women held by the TANFL RichElite, and was able to learn about the harem structure and its great rewards of good life for those lucky women.... So just

which harem now had her boss Idealiana? She bet it was one associated with someone who would parade ride in the truck with the stanchion for a flag. She was well past the marriage age of 15 and was among the most sexy looking and brainy women at 17, and her smile and sweet questions soon found out the car was of corporate leadership, often used by a leader named Rationallo and his friend Guardiano. Would she like to be introduced to them? They both have new wives but surely soon would be seeking more. Yes, but at some other time, thank you, she replied.

TANFL Political Corporation changed its long term strategy to that of being supportive of 3Musketeers' project to build a space escalator to GEO, and the applications which then would be possible, especially the ring of cities around the earth in GEO. However, the recent accident that had demolished 3Musketeers headquarters and manufacturing facility, had also destroyed the production of the hundreds of millions of electric motor sliding armature segments needed for the escalator's support. 3Musketeers always operated at the brink of financial collapse; and had no way to restore that production capacity in the near future. TANFL would have to supply the lost production capacity, but how? The whole space escalator carousel project required countless innovations; thus was an abomination to the very principles of TANFL.

So Rationallo arranged to have a meeting with someone from the Prospective Wives group. He had learned of an attractive smart 17 year old woman who worked as a longshoreman at the city's 3Musketeers port facilities, and arranged for an interview as a prospective wife, but for a real purpose that was quite different; one new wife was quite enough to deal with for now.

And he would need another job promotion to be able to afford another Haremspace Model 14a Version 2.

Meeting with Rationallo for the first time, Artisiana's first impression was that he was a stunningly handsome powerful looking man with an air of absolute confidence; tall at 7 foot 6, the perfect image of the Leroy Brown icon. She had worried that an investigation into her past for marriage purposes would likely turn up her real past and double identity, yet she plunged on undaunted. Soon she realized that Rationallo was not being amorous, but had intentions of making a secret business deal which he wanted her to handle. He would declare her a wife-at-large, provide her with a small fortune which was to be used to rebuild the manufacturing facilities for producing the critical components for their space escalator project, but not traceable back to TANFL. The business was to be hers, not his; but he would be secretly available to advise and make the major decisions of the business. This was fine for Artisiana, since she had little urge to plan and manage; but liked the adventure of making things happen in the physical world in a dazzling way. What an opportunity, to get the space carousel escalator project going again! It was going to be great fun.

Artisiana started reconstruction of the ruined 3Musketeers headquarters manufacturing plant by having the old concrete and burned machines and bodies all bulldozed into a cube shape, having concrete cast over it and engraved with the names of the fallen stored within.

Then when the first section of the new plant was constructed, and new hires essentially without skills were all she could find, on the first day of work, she gathered her new staff in the room. "Welcome to the new beginnings of the great 3Musketeers Political

Corporation's headquarters manufacturing plant. We are going to great things here, you and I; all of us together. All for One, And One For All!

"We are going to sing the 3Musketeers company song, but the second stanza will have new words. The first stanza are those written long ago 'You load 16 tons of number nine coal and what do you get, another day older and deeper in debt. Saint Peter don't call me, I can't go, I owe my soul to the company store. " To the same tune, the new second stanza words are: 'You load 16 tons of 3 mm armatures and what do you get, another day higher and closer to orbit. Saint Peter don't call me, I won't go, I make my future with the company goals."

'Then we do a bit of cheery exercise before heading for our workstations. It goes like this: Still standing, shout 'Ho, Ho, Ha-Ha-Ha' while first lifting one knee and reaching across with the opposite hand to pat the knee with the first Ho, then put that foot down and lift the other knee and pat it with the opposite hand at the second Ho; then reach straight up over your head and clap your hands flat together, hands positioned in a mirror image of each other, while saying the Ha-Ha-Ha part. We do this several times; then stand relaxed and silent just feeling, for half a minute. then off we go to our workstations!"

She was not much at analyzing, planning, or engineering; she was great at getting things done. Right now, she was in great need of details about what she needed to make happen. In her new office, she stopped to evaluate her situation: all the people who knew how to make the things, those sliding armature things, had been killed in the sudden destruction of the building. At the same time, all the engineering specifications and drawings were also destroyed, all

the machines needed for their manufacture were destroyed. Everything gone. What exactly were the things anyway? She thought back to the name on the boxes she had delivered as the final shipment from here to the port. Something like “3 mm sliding armatures, 1000 each” So she was going to have those people out there make make more boxes of thousands of whatever those things were. Sliding armatures. Right.

She wished the vending machine for those jelly bean stimulants had not been destroyed too.

Over in the TANFL Political Corporation HQ, Rationallo was having midmorning thoughts too. Had he really made a deal with the 3Musketees, a teenage woman at that who surely would be better at making babies than making a manufacturing plant happen. And it all had to remain a secret deal. Not that TANFL Corporation was unfamiliar with making secret deals aplenty; but it had to be done according to the rules. And the rules did not say anything about mutual projects with The Enemy, the 3Musketees Political Corporation. He had told Artisiana that all she had to do was provide a 10% profit quarterly, and no questions would be asked of him by TANFL board members. She would be allowed unlimited innovation opportunity, but all those innovations must be confined within the manufacturing plant, and without any patents applied for, thus no word of them getting out.

Guardiano had been quite enthusiastic about the prospects enabled by a successful carousel space elevator that moved most of the population into temporary quarters built in GEO. At that point Guardiano would change their plans quite abruptly. But for now, there was the need to get the transportation structure built and running; even at moving one million

people a day, along with their basic household belongings, it would take two decades to get all them up there. Building the cities up there, mostly of lunar materials, at enough room for a million people a day also was almost unthinkable, too: but that was another later thing to deal with, and the 3Musketees were going to have to do that, not him.

Those 'sliding armature segment' things, what were they anyway? He brought up the wall vision screen and accessed the world knowledge base. He input "sliding armatures". Reply was that it was associated with forbidden technology, info unavailable. Only by accessing old science fiction databases could he get any reply about the carousel space escalator's basic idea. How much could he make solid plans for manufacturing the inner working parts, based on old science fiction stories? This was not at all to his liking.

Those science fiction stories were linked to some old web pages, which sketched out some ideas, both in words and sleazy graphics. It involved a hoop big enough to completely go around the earth, stretching far above the earth on one side, and its loop contacting the ground on the opposite side of the planet.

It was like the hoop was spinning around the planet, faster than orbital velocity, trying to stretch outward, away from the center of the planet. It was the insides of the hoop that continually revolved around the planet, that is; while the outside of the hoop remained motionless relative to the surface of the planet. The insides of that hoop were in constant motion, so fast that the centrifugal force they created as they revolved around the planet along the hoop's perimeter, was great enough to exceed the force of gravity on those high velocity masses, exceed it enough to push outward against the hoop hard enough to support the

weight of the hoop. And those “insides” were the “sliding armature segments” that were the problem today. Those things slid along magnetic levitation tracks built into the motionless outer part of the hoop, and got sped up by electromagnetic pushes when passing through the ground terminal accelerator, and they did not bump into each other. Millions of the little buggers, all going at once. Who said this thing would work, even could be built?

Well, it was rumored that the 3Musketeers already had the beginnings of one already in working condition, and were in the process of using its current lift capacity to lift the materials for building a Solar Power Satellite in Geostationary Earth Orbit, by which it could thereafter power itself, free of the dwindling earth surface energy resources. Its ground terminal had been built within an east-west tunnel bored through high up in the Andes mountains, right along the equator in Ecuador. They were also preparing to start building another one, which would have its ground terminal in Africa.

And the insides of these hoops were going to consume prodigious quantities of these sliding armature things, billions of them maybe. Things that now no one alive knew how to build. Things for which the plans had been destroyed along with the engineers and technicians and manufacturing personnel that had made them. And the tooling with which they were manufactured. All gone.

And it was worse in that he knew he had helped create that destruction. Now he had to fix his mess. It was not a good day, so far.

Chapter 4 Haremspace Model 14a

Time began to pass for Idealiana as in a haze. Sameness of her surroundings both made her lose awareness of herself as separate from the Haremspace Model 14a Version 2. Its built-in instructions led her every moment's activities; it kept her physically in shape; yet made no place for her emotions nor her beliefs and dreams. She could change channel on the television, and access a selected few website data sources; otherwise, she had no way to use free will, and so it began to fade over the months. She produced a daughter, which she named Donna Bullgarde; and that kept her out of the digestion vats for now. Part of her mind lived in a dream land of her own making to some extent; otherwise, her mind was occupied with following the home care instructions of the Haremspace living quarters environment. No other living thing there, no pets, no houseplants, just her and now her baby daughter; and the rare short visits by Rationallo.

Her memory of her life as a top manager for 3Musketeers at headquarters manufacturing plant, making sure the sliding armature segments were made correctly and in correct quantities on time, sometimes recurred as in a dream when awakening in the morning, but quickly faded as irrelevant to the demands of Haremspace's instructions to get get up and get on with the day's routine: change the diapers, clean the floor, use the ski machine for exercise, watch TV one hour, etc.

It was during one of those TV watching hours that her favorite program, one that she and Artisianana had sometimes watched at lunch break back in her former life, that she began to notice a painting on the wall of

the soap opera. The painting was only in the background, part of the stage scenery, yet it looked a bit odd, not quite at the proper slope for its wall position. Looking rather dreamily more carefully at it, what was it ... an object instead of a flower vase... it was a... it was a sliding armature segment! What? What was it doing there? The soap-opera continued on as always; the people did not ever refer to the paintings on the wall.

She began to look forward to that picture on the wall of the soap opera set during her hour of TV watching. Each day the camera would briefly pan past that wall; and each day the armature segment was there, but was in a slightly different position each day. She wrote down each day which of the three positions the picture was in; and looked for a pattern in it all. Two positions were used most of the time, the third one only rarely; yet it occurred regularly, always after the same number of days had passed. Several months of this data collection passed, when she suddenly recalled the ASCII symbol code had that many bits in it. Accessing the web database, she found the ASCII code; and assigning bits 1 and 0 to the two more frequent picture positions, one of the two possibilities made intelligible words. Among them was the name of her former friend and coworker, Artisiana. What was going on? It was unlikely that anyone but her would have noticed the background photo as being a sliding armature segment, nor would notice its shift in position, the flow of the soap opera's drama being the focus of attention of the show. Somebody knew she was here, and it was probably Artisiana! That girl had been outside the building when it was destroyed, and she may have seen the abduction of Idealiana and her secretary. And now was attempting to communicate with her. How could she communicate back?

She could not use e-mail, and there was no phone. And what would she say? She did not even know where her Haremspace living environment was located. Maybe the info that she was alive and in a Haremspace would be useful to that resourceful Artisiana gal.

What were her options in life? Besides to either make babies or go to the digestion vat. She could choose the TV channel she watched; she could look at a few website databases. The TV ratings would log how many people watched each program, yet hers would be one of billions. The web sites would also record how many visits were made to a site, too. Some would also show how many visits total were made to its website. Could she see the results of her own visits to web pages?

She found a website which gave rather dull statistics about TV shows, including her now extra interesting soap opera. It had a visit counter which she could observe. By logging on and off the page, she could see it increment. She could make a deliberate effect on the outer world!

So each day, right after the soap opera's camera panned past the significant wall picture and she got its position identified and recorded, she would log on and off that website several times rapidly. 5 times to indicate an ASCII start signal; 4 times to indicate a "1" bit, and 3 times to indicate a "0" bit. She had sent the words "sliding armature segment" only once when the pattern of TV show wall picture changed from its routine.

The new message, which took 3 weeks to send, was "Hi, how are you?" Idealiana sent back the message, "Haremspace Model 14a Version 2."

Idealiana began to dare to think that this egg-laying hen in the chicken coop might have a different fate than the others.

The next message was “Ours don’t slide well and they collide, how to fix it?” That Artisiana gal was resourceful, but practical, too. Maybe she wasn’t on a rescue mission after all, maybe she just needed info.

Idealiana thought back to the “disaster” that destroyed the 3Musketeers headquarters. All the engineers, designers, technicians, even assemblers would have perished; the engineering and production documents destroyed too. They must have started almost from scratch to re-create the means to make the sliding armature segments.

She wasn’t cognizant of the engineering details of all the designs and processes, although she had, at least at one time, a firm grasp of how they all interacted. How could she help them, in five easy words?

She sent back the message: “Show Rationallo advantage of setting me free.”

Chapter 5 Monitoring implant

The next time Idealiana was visited by Rationallo, she told him that she had a dream, that it was imperative that she resume her job managing the production of the sliding armature segments. And that he believed she knew too much to be allowed freedom, and was in a bind over all that. True? He grudgingly agreed.

So she proposed that he keep her daughter Donna Bulgarde as hostage against her revealing anything about the Leroy Brown Society's caper that destroyed the 3Musketeers headquarters. She had been listed among the dead or missing; but if she could be secretly placed in Europe in some vacation disruption circumstance that would have prevented her return all this time, then be "discovered" there, she then could be returned to work at the new manufacturing plant, and hopefully be able to get the product made correctly again.

Rationallo agreed, but with an additional requirement: she would be fitted with implanted microdevices that would enable their constant monitoring of her every move and thought no matter where she was, and another one to which they could send a signal that would instantly kill her by a stroke, at any moment they chose, anywhere. Even think about betraying the Society and she was dead, right then and there. She would only go to TANFL doctors for any reason; and they would do any autopsy, too. And she would give up all connection to her baby daughter, to be given to one of his other harem wives to care for until she was 3, then would go on to the harem's usual group raising process, and nevermore know of Idealiana.

A bit white faced, Idealiana agreed.

And Rationallo thought to himself that if the Society ever found out about this, they both were dead meat, and he far more uncomfortably than her. He understood that the only way for the planetary takeover which Guardiano had described to him would happen, required that the Space Carousel Escalator be built and used to get most of the world population “temporarily” moved up into GEO space cities; and that needed Idealiana’s experienced help. But he also knew that the Society was implacable about the need to maintain their pure image to the public, and was merciless to any that might put them at risk of discovery.

It had been over a month since Artisiana had heard from Idealiana using their TV code link, and was a bit frantic for solutions to the production problem. Not one sliding armature they had made worked adequately, and she needed clues as to what to try next.

Then the news came that Idealiana was on her way back, she had been on vacation in Europe during a wreck and had been in the hospital in a coma ever since. She was enough better now to return to help the manufacturing plant on a consulting basis.

Chapter 6 A fuzzy dream made physical

The manufacturing plant was not the one she remembered. There was that 10 meter concrete cube which had the names engraved on it, which had to be passed to get to the front entrance. The building was in the same place; but the people were different. Inside it all looked like something remade in a fuzzy dream by half conscious people; yet in ways, it all had some resemblance to the one she had known so well. The place where her office would have been was conspicuously an empty area. Next to it was Artisiana's managerial office. The two looked at each other for a moment, silent. Then Artisiana, not one much for thinking too much, a lady of action, left her desk and motioned Idealiana to take it over. Then she took a side chair and watched, as her former boss come back to life, began to inspect the production flows that were built mostly upon Artisiana's vague ideas about how it had all been before.

So this is a fuzzy dream made physical, Idealiana thought, as she began to set in motion the sharpening up of those fuzzy devices and systems, get some specific training going for whoever needed it. It all looked like it had potential; and that was what Idealiana enjoyed most, was to figure out how to make the details so the big picture would work.

First, why wouldn't they slide properly? The armature segments were only meant to float along an inductive magnetic levitation synchronous track, at 10s of kilometers per second. The inductive energy went up as the cube of the velocity, and they were testing them here at a fraction of that velocity. In the real escalator structure, they were held above the tracks by external

energy to support the armature segments until they built up to an adequate velocity to inductively support themselves. Here they had been attempting old rail gun type concepts, which would not work, of course.

But there were no engineers remaining who were capable of implementing such devices. All they had were essentially previously unemployed people who were willing to take the task on. They had been put on a strong On The Job Training system as part of their daily job, and continued with internet classes at home later each day; yet the experts who could have even really taught much of this stuff, had their remains out there mixed in that big concrete cube. The pressure had been on, the people in the production offices and manufacturing line looked haggard yet still determined. They were all working like heroes. She felt a moment of pride in the 3Musketeer's motto, One for All, and All for One; and it was being practiced here incredibly in the effort to get this all to work, as part of what they felt was key to their future survival and that of their progeny. It would mean no more digestion vats, for one thing. And some of them were getting close to the age or situation where they would have to make that one way trip to the vats; they surely would not make it, but were doing their best for those who would remain afterwards. The will to succeed was there, but the knowledge and skills were not all there yet. When Idealiana took a moment to lean back and meditatively rest a few moments, she realized that this was the kind of adventure she liked.

Yet when things were still going sour, she remembered that long lost Far Side cartoon she had pinned up on her former office's wall, the one showing a haphazardly constructed broken egg-shaped person lying below a wall, and the king's men were saying that the horses wanted to have their turn at it again.

The other major complaint was that even at low speed, the armatures sometimes would bump into each other. They were too small to have collision avoidance systems built into them. How did that work, Idealiana wondered. On her desk were a handful of armature segments built before the catastrophe. Dissecting them showed them not too different from the ones that were now being built but which would not slide at high velocities nor keep from crashing together. There were some odd inclusions in the working ones that had been thought to be mere artistic design, and had been imitated only vaguely. For one thing, they were not all the same.

She learned of an interesting maintenance device being created by the technician's wife on site at the early escalator's ground terminal tunnel in the Andes in Ecuador, and requested one be built for Idealiana's office too, even if still far from being fully developed. The Holovision device locked a person's senses and brain waves into a virtual reality world which was an abstraction of the components of a system, all in 3D living color and sound, all the senses. Idealiana input all the parameters of the sliding armature segments in all their variations, and the magnetic track configuration, and meditatively locked her experience into it all in motion. What she first discovered was that the various shapes of armature segments would jostle themselves laterally like atoms grouping into a molecule, when bunching up together. And that most of the time they never had a chance to bunch up anyway, being synchronously position monitored by the intelligent magnetic levitation system, with little puffs of magnetic field ever adjusting their precise location, during the shifts and changes that happened due to changes in lateral forces on the structure and by passing live loads cruising between ground and GEO

along the outer part of the structure, slurping a bit of kinetic energy from the segments as they briefly passed each other, or adding position energy to the whole structure in their decent back to earth surface.

She then input the parameters of the currently produced armature segments, and watched them mess up. Enabled by the Holovision device, she intuitively became each part of the system in turn, felt the jostling done to a single segment input to a system of otherwise correctly operating system, and noted where changes had to be made so as to not be jostled anymore. Coming out of the experience, she realized that her Holovision instrument needed to be integrated into the whole production line, where she then could communicate directly to the managers and technician and manufacturing workers on their terminals, showing them the changes each needed to do, bit by bit.

As the weeks went by, she felt more at home inside the virtual reality, ever more unified with the incredible diversity of energetic beings that mimicked the real physical things of the production line. Then she realized there was a pattern in her responses, to her response to stumbling over some change that needed to be made; and so she created a simulator in the system for those almost reflexively performed managerial responses. As the months went by, she realized that much of her own being was now copied into that system, that would continue to work even if someday she could not show up for work anymore. And she felt more at peace.

Meanwhile, Rationallo was having trouble with his implant monitors that were in place to stop Idealiana cold forever if she made a move to betray him or the Society. Whenever she went into that Holovision thing,

his instruments sometimes would be overloaded with their echo of her essence as expanded by the Holovision. He had to personally intervene whenever the monitors went into alarm mode, to verify that she was just monkeying with some part of the production line hologram.

It became quite a challenge to him, so this side job as Idealiana's virtual manager increasingly absorbed the energy that previously had gone into his participation in the Leroy Brown Society's meetings, to counteract the boredom sameness of his otherwise perfectly predictable managed corporate system. Guardiano sometimes would look oddly at him during their meetings and adventures with the Society, both a bit worried and marveling too, that Rationallo seemed to be both frazzled and more powerful than ever. Yet it was not proper to ask of such things; the Society members were all very much "He-Men", and most were literally Alpha Males having their own harems by now.

Chapter 7 Armature quality control

That she was working in a reincarnation of her old manufacturing plant, and aware that it could be destroyed as quickly and “accidentally” as was the former one, simply due to business-political mischief; and that she herself lived on the edge of death from the implants because of the same bunch of power-crazed mischief makers, had become a tough but tolerable environmental set of factors for Idealiana, as she continued to merge back into the role of manager. They finally had produced a set of new prototypes that had passed the test at the Ecuador Andes facility, and had made a test run around the Carousel to GEO and back without trouble. It was a Go for a manufacturing run.

Her application of the Holovision Presence monitoring system was multiplying her effectiveness on the job almost by the minute; and the temptation was great to allow it to be used at other 3Musketeers Political Corporation facilities; yet her agreement with Rationallo was that she could innovate without limit here, but it must not result in patents nor spread beyond the facility. She signed with sadness and frustration about that; yet she knew that innovation was really illegal under the regime of the TANFL political corporation, which had taken over the country as if with a military battle assault but using civilian techniques instead of guns and tanks; yet it was an accomplished fate, and she and the others were stuck with the situation. It was only through some minor miracles that even she could use innovation now, and that only because of some unmentioned switch in TANFL policy toward the 3Musketeers Space Escalator Carousel project.

She went into the tiny cubicle where the Holovision Presence device was installed, and turned it on. Her

self-awareness expanded out to the edges of the cubicle, then the office beyond, then out into the manufacturing plant facilities, like the clearing of fog that had enveloped a city. She focused attention into the final test station of the “3 mm sliding armature segments” that were the primary product here. A group of 15 armatures moved in a fitted bunch through an opening of the shape of the perfect group; if any one of the segments was too big it would shove outward through the group of segments to collide with the opening somewhere, and the whole group would be sent to the re-inspection station, to find the defective one. She focused on one such reject: entering its presence, she found that spall fragments had pressure welded into its side; flowing back in time of that armature segment, she saw the collision that had spalled the armature, and to where the other fragments went. Chasing them all down, she activated dropouts for all those armature segments, and put in a request for burnishing of the fixture at one of the armature assembly stations, to prevent further spallings and subsequent failures. The Space Escalator Carousel had its own high velocity inspector for each of the armature segments as they passed through the accelerator at the ground terminal; but she would rather catch the defective units here.

Chapter 8 How did we get here?

Break time was mandatory, even for Idealiana. She leaned back in her office, meditated a moment, drifted into thoughts which ever clamored for attention when she had moments not intensely focused in management tasks.

Idealiana thought that the TANFL people were not bad people; they were much like 3Musketees people as humans; but the TANFL people seemed universally infected with what might be caller winner-mania, or topdogitis. They did not pause, like she was doing now, to introspect, or evaluate their effects on the Big Picture. In fact, if TANFL people were to pause to introspect on their lives and ways, it might get scary, like they had a tiger by the tail, since the Golden Rule - directing to treat others in the same way as you yourself would like to be treated - the frenzy to win by beating the others at something and everything possible so as to get far more than their share of the goodies, more than they could possibly use themselves -- then the Golden Rule would direct that they themselves be eventually conquered constantly by those others. Quite a dilemma for them, and so no doubt it kept them at the mania to win by defeating others, ever distracting and probably hoping the others would get sent to the digestion vats before the Golden Rule gave those others their turn. Quite a tiger-by-the-tail it was.

Yet also the consequences keep multiplying, affecting the whole world, all people. She could remember when she was a teenager, when they declared war on the "wild animals", saying that they were consuming resources needed by people, incubated diseases that spread plagues to people, and were carrying toxin load making them unfit to eat anyway. Seeing newscasts

following the progress of the war: armies using AK47s on elephants, rhinos, giraffes; the adventurous hunt for the last of the polar bears which had not succumbed to toxins in their natural food sources; the sonar-guided depth charges killing the whales. The airplanes strafing the flocks of ducks and geese in their migrations. The crop duster airplanes fitted with hundreds of automatic 22 rifles, strafing the duck ponds and nature preserves everywhere, lacing the environment with lead to poison whatever might be left alive in the wild nature world. And the hordes of businessmen that followed the war campaigns against nature, who bid among themselves for rights to the newly freed land resources, ever to make the most money possible in the dealings.

And she remembered newscasts of the groups that declared that the problem was not the irresponsible refuse-strewing predation on the world by narrow-visioned people; but instead that it was caused by too many people being alive, and those groups, sometimes led by intellectuals that could do Malthusian equations better than they could see the wider world, seeding diseases among people, and instigating war excuses between nations to get them to fighting each other, and growing paranoid fears requiring checking of individuals' luggage during trips, and scans of their homes when gone, to make sure they were not possessing something "bad." Its success depended on a generation that had grown up on cartoons and comic books, where it was expected there to be bad guys from far away lands, with weird names, that had the intent to destroy them... no reason needed to destroy, no more than there be reason for there to be the assaultive other team on the other side of the football field, or someone on the other half of the tennis court. "Suicide attacks" followed the rules that "dead men tell no tales," and were used to get the games going.

At least the Red Cross' ARK division had representatives along on many of the Nature War campaigns, that obtained DNA samples from as many of the carcasses as possible, storing them in archives, maybe to be resurrected somehow in the future. The rotating cities in GEO that would be made possible if the Space Escalator Carousel got fully built and used, there might someday be some Stanford-Torus type structures which were modeled after environments ranging from the African Savannah to the ocean depths, where that DNA might again become real animals roaming. And -- dream on -- from there back to a cleaned and recycled earth surface in the distant future, no more digestion tanks, no more hordes of winner-mania people running the world. No more women being captured by the TANFL polygymists to live the rest of their lives in Haremspace quarters, making babies until they went to the digestion tanks ... imagine, every woman free and having her own man as mate and companion! And it had been that way, she had read, long ago.

She realized it was not their fault. The educational system had taught the competition as part of getting educated, eventually focusing the studies entirely on "winning" at every aspect of life, because, like the introduction of Mono Sodium Glutamate into foods, the ones that did not have it were not as "exciting" as those without it; and so the ones that focused on just learning what it took to be doing a fine job lost out, since few of the TANFL corporations would hire them.

Another moment indulging in the playing of the game of "what-if": what if people had built the Space Escalator Carousel and used it to build the solar power satellites, the total recycling plants in the GEO environment, the high spaceports in GEO for travel to far places in the solar system in style, the building of a few cities in

GEO ... it could have been done way back then, and none of the Nature Wars nor the digestion tanks feeding dual quality grocery supplies, no need for her to be here with implants in herself that monitored her every move and sent the info to an implacable businessman with his finger on the death button in her brain. But no, what really happened was that the Carousel was in the "Not Invented Here" category for the corporations back then, and their scientists in the space field only knew action-reaction engine rocket space travel. Sure, the Escalator Carousel would only work for ground to planetary orbit transportation use; but that is a critical place where rockets with their massive take-along load of fuel were quite inefficient. Launch vehicles would be much more useful starting from GEO spaceports, after being lifted cheaply to there electrically by the Carousel.

And so now back to reality: her own struggle to manage the re-creation of the critical sliding armature segments for the Escalator, that was where it all was now; and it was now the end of her break time, back to work now.

Some things were especially interesting. The chemical that resonated with the Holovision Presence device, luckily was quite durable, and so she had it incorporated into every armature segment they built, every fixture in the manufacturing plant, every manager's office walls and terminals. If it were not somewhat toxic to people, she would have had it put into her coworkers' caffeinated jellybeans. She spent more and more of her time in the Holovision Presence nook of her office, routinely checking through the progress of her factory literally from the inside out. And she decorated the system with whatever she found that was beautiful and friendly. It became a place almost of escape from the bitter realities of the physical world.

Chapter 9 Oh oh I look expendable

She spent more and more of her time in the Holovision Presence nook of her office, routinely checking through the progress of her factory literally from the inside out. And she decorated the system with whatever she found that was beautiful and friendly. It became a place almost of escape from the bitter realities of the physical world.

When a month had passed without her having to solve a crisis on the production line, and several full shipments of sliding armature segments had gone to Ecuador and had been incorporated in the latest tracks without a failure, Idealiana suddenly woke up to the thought that she was somewhat expendable again. And a risk to Rationallo that maybe was no longer necessary in his mind. She had a batch of jelly bean stimulants made up with the presence chemical, toxic or no, and she tried some. In her next Holovision Presence system examination session, she discovered she herself was also shown in the system, as were the two implants, including the one in her brain intended to cause her death by stroke if she so much as thought of betraying Rationallo. She was not intending that, but now she had more info on the subject, in case of need.

And over in TANFL Political Corporation's main office, Rationallo was indeed worrying. He was not a man who took chances normally, nor dealt with managerial duties where there were any unknowns in the system. The outlawing of innovation had made management quite a bit more predictable, and life had been built around that predictability for over a generation. Now he was into his fourth month of worrying that any minute Idealiana would betray him, and have his world go into ruin around him, the Leroy Brown Society turning on him with their merciless terror that was the technique by

which their effectiveness was so powerful, the power behind the TANFL throne. And it tolerated no traitors. While Rationallo was no traitor, he had far overstepped his mandate by releasing Idealiana, even to get the production line going again for those essential armatures for the 3Musketeers' space access project.

He was monitoring Idealiana by the monitor implant when she was in that Holopresence thing, and again his readings became erratic, as usual when she was in there. It seemed even more erratic for the past week. Did he need Idealiana to get the production line going anymore? He needed clear thinking time to prepare for the next Board meeting, and this distraction had gone on too long. No, he did not need her anymore. He reached over and pressed the Stroke implant activation transmitter button, noted Idealiana's monitor signs go wild and fade out. It was time for him to go relax;. he felt like his old self again.

The 3Musketeers sliding armature manufacturing plant's doctor found he had an emergency on his hands. Their top manager had a stroke, and was now on the operating table. Yet he knew she was too young, too fit, to have had a normal stroke. She was still alive, but what to do now? He took some of the new jelly bean stimulants that she had issued just that morning, he needed extra clarity of thought. and suddenly, he was part of the Holovision Presence system, which included Idealiana on the operating table. And it was obvious she had two brain implants, where did they come from? And one had been a tiny bomb, that had gone off and caused the stroke. Her brain, bone structure all was in full detail there; and rapid operating removed both implants and sealed off the stroke area; the Holovision Presence even showed where to put in a few microtubes to get normal blood flow going to damaged brain areas. The task completed, and now

somewhat amazed by the whole thing, the doctor sent Idealiana to the recovery room. And he requested guards to be always present there, and no word get out about her condition.

Idealiana awoke with a very bad headache. She noticed she was as if in the Holopresence nook of her office, then realized that the chemical she had put in her jellybeans, the same one that was in the armatures and walls, everywhere in the manufacturing plant, when combined with imbibed chemicals, made the whole building a Holopresence terminal. And she saw her physical body here too, headache and all, the surgeon's work so well done. It had worked, she had managed to get the chemical into the doctor's jellybean stimulant supply just in time. Rationallo must have decided she was expendable and a nuisance no longer needed. And she was still alive! And she saw that both implants had been removed by the doctor, which meant that Rationallo no longer was getting biological and covert speech data from her anymore; he probably believed her dead. So let him think that.

With the Idealiana tasks behind him, Rationallo was better able to resume his normal evaluations of the TANFL Political Corporation's profits. He found they had been sliding downward in the past several months; not fast, but a trend that would be noticed by the Board, and answers would have to be supplied as to why and how to fix that.

He had watched, via the implant in Idealiana, how innovation was able to provide ways around problems, instead of brute force making them work as in the past. Innovation was outlawed, yes; but his was an old corporation, and engineering had notebooks going back, way back. And the TANFL law had frozen innovation long after those engineering notebooks had

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been accumulated. If he kept to technology that existed before the laws against innovation were put into effect, he could have the contents of those old engineering books revised a bit. He could proclaim that solutions had been found in the old records, and put them into effect legally, or so it would seem.

And it worked; by the time the board meeting convened, the profit of TANFL Political Corporation was fully recovered, even a bit better than had been projected.

Chapter 10 Secret innovation expands

In their conversation at the nightclub usual celebration after they had participated in the weekly Leroy Brown Society meeting, Guardiano brought up the subject of the 3Musketeers' abominably innovative project they called a "Space Escalator Carousel" wanting to know more completely what it was, how it worked, and how it would affect the traditions by which people lived. He knew that it had to do with building big things high up in orbit, things that could not even begin to be economically done with conventional rocket launch vehicles, not even nuclear powered launch vehicles; and therefore was not permitted by TANFL's puppet government. Yet the 3Musketeer people were still going ahead on it, claiming it was about all that could "pull the fat out of the fire" for humanity, at this point. How could they be so stupid? Didn't they know that they were the losers, game over for the 3Musketeers; and the TANFL RichElite people were all that would survive into the future? Maybe it was time for the Leroy Brown Society to arrange another raid into the 3Musketeers' pantry, to speed the process up a bit.

Rationallo was more relaxed than he had been in months, having received telemetry from the two implants that had been implanted into Idealiana's brain, indicating that they had gone into the digestion vats. He felt powerful, one more big problem sent to moosh. Yet the intense competition activities that were ever stimulating the TANFL Political Corporation people so as to keep them in shape and ever on their toes, focused his thoughts even now, shaping response to his friend Guardiano's questions.

Rationallo had done deep research into the 3Musketeers carousel-escalator-thing project. Turns

out it did not need super innovation technology, as it was mostly based on electromechanical principles used long before the ban on innovation. In fact, the description of the project had been made in obscure papers even before the turn of the millennium. Yet was all too far from the mainstream of moneymaking at the time.

Guardiano was rattling on about escalators. They are either there or they are not there when we need them, end of subject. Use the stairs, elevator, or better yet, don't bother going up there. Why think more about escalators? He did not have the knowledge or the facilities for building an escalator somewhere even if he needed it. The whole thing was the domain of others, who would only build an elevator if it was going to make them substantial money. Plain good sense. Why build an escalator up to nowhere, where nothing much was?

And space was high up, wouldn't it take super strong materials to build something that big? And how could it all be economically feasible, it was obvious by watching the powerful launch of the immense rockets that were needed to put a small communication satellite into GEO, that it took incredible amounts of energy to put a little bit of mass into GEO. It was all harebrained, the whole thing. Solar power satellites, total mass-spectrometer type total recycling plants in GEO, spaceport facilities for conventional rockets at GEO, even cities built in GEO. They were all nuts. Yet the word was to support the project covertly, in the long run it would give TANFL the whole world, for free. So, what was it all about, he asked of Rationallo.

Analysis was one of Rationallo's things. Escalators were transportation structures that made movement to a high level almost as easy as walking on flat ground,

and thus it opened up the land area to almost twice what it had been previously limited to, by the casual movement of shoppers and businesspeople. Escalators were good for business, fairly simply multiplying usable real estate area.

As for needing super strong materials to build something so tall with, think about using stored energy for strengthening support. Actually, all strength of materials was through stored energy, that of intermolecular forces within the component materials. In this case, even more energy was input to a structure, and in a dynamic manner that was perfectly formed to support the weight of the structure in the particular environment it was in: the inverse-square-law gravitational field of the planet. The transportation escalator structure would encircle the planet, enclosing stored energy in the form of high velocity mass continually going around and around the planet, the thusly generated outward centrifugal force of the circulating mass being set to be slightly greater than the inward force of gravity on the earth-stationary part of the structure with its loads. Thus the weight of the hugely high structure was supported mainly by the dynamically stored energy within itself. It did not need super-strength materials, in other words. It could be built of plain ordinary strength materials.

Even so, Guardiano stated, it took too much energy to put payload into GEO from the ground. Hadn't Rationallo seen videos of rocket launches? Absolutely immense amounts of energy obviously being expended there. What is the matter with him, anyway?

Rationallo was still in a good mood, and took another sip of Brewstim. It was a good day, and he was in control.

Think a bit about how much energy it takes to lift something, Rationallo said. Sure, climbing a mountain or even a dozen stories of stairs in a building, put reality perspective on it all for a person. Yet, numbers purified the problem, separating out such things that were not intrinsically involved, like if one had had too much to eat before starting the climb.

Back in the 1950's, it had been shown to the layman that the energy needed to lift something up through the gravitational field of a planet out to an infinite distance away, could be simplified to be equal to that needed to lift the something to a height equal to the planetary radius ... 4,000 miles in the earth's case ... with a constant gravitational field equal to that at the planetary radius, the surface, ground level. For comparison, it is the same energy as needed to impart "escape velocity" to the mass; 25,000 mph in the case of the earth, he pointed out. Anyway, to find out the energy needed to lift only up to some altitude lower than infinity, one needed to do the same kind of calculation, only this time using the "planetary radius" equal to that other altitude, 22,300 miles + 4,000 miles in the case of GEO, and using the gravitational acceleration at GEO as the constant force for that simplification. subtract the energy need to go from GEO to infinity, from the energy needed to go from ground to infinity, and you have the energy needed to go from ground to GEO. Easy as that. There were equations if one wanted to crank the quantity out that way.

To determine the energy needed to lift from ground up to GEO, one needed to add the energy needed to speed up the mass to get it going at orbital velocity at GEO, so as to stay up there. The sum was the energy, or work, needed to move from the ground up into GEO. And that amount of energy was 7.2 KWh per pound; and for perspective, at an electrical cost of ten cents

per KWh, that is an energy cost of \$0.72 to put a pound of something into GEO. Cheaper than the cost of moving it across the country, he pointed out.

Sure, there were lots of variables not considered, like the efficiency of the magnetic levitation track, along which the masses circulated at high velocity within the structure. Lots of variables. Yet, that the energy cost was not intrinsically a problem, was his point here.

And besides, once the thing was up and running and had lifted the construction materials for building some solar power sats up there, some of their energy could be beamed down to the ground acceleration site to power the structure itself from then on, no need to buy energy from somebody else, at their price.

So, he asked Guardiano, what can you build economically when the energy cost of transportation is around \$0.72 per pound? It is not rocket science, he added. In fact, quite literally not rocket science, that was the point. And also was the problem, because the industry was based on rockets.

On the table's computer terminal, Guardiano had been clicking out the numbers for the calculations, following along with Rationallo's chatter, The numbers were correct. And it was plain sense. Uncomfortably too plain. What would come of the business world if all that new business "real estate" plopped on the market? He used the terminal to order some more Brewstims for each of them.

After a moment, he thought of the basic problem, the huge amount of fuel needed on the vehicle to lift up to space. But Rationallo said that the whole point of the escalator was so that no fuel was needed at all for the trips up and down the escalator. All the energy was

delivered to the point of need by the transportation structure itself. In a store escalator, the energy was delivered to the step upon which the person stood. In the case of the space escalator carousel, it was delivered to the spacecraft riding along up the outside of the structure, in vehicles which electromagnetically dragged against the high velocity upward moving armature segments, transferring some of their momentum to be upward momentum for the spacecraft with its contents. The spacecraft lifted no fuel at all, no weight of fuel to be lifted by the spacecraft! The energy was all put into the sliding armature segments by synchronous electromagnetic mass accelerators at the ground terminal of the structure, the enormous mass of the earth being pushed against in the speeding up of the armatures passing by. Electrical energy was used, which could come from any electrical power source. And, he repeated that eventually it would come from the solar electric power satellites it itself had made possible in GEO; thus in control of its own power source, which ultimately was derived from the constant energy flowing to there from the Sun.

Guardiano pointed out that the whole thing was an abomination, against the laws of business constancy upon which TANFL was founded. So why were the orders coming down ordering them to quietly support the 3Musketeers abominable space access project?

Grinning, Rationallo had figured that one out, too. It was the cities they would build in GEO, he said. Lots of cities, mostly built of structural material from the Moon, and supplied with other material like water, from the usual earth resources. The 3Musketeers nuts were going to have everybody abandon the planet to temporarily live in those cities up there, and then do a drastic makeover of the earth's ecosystem; then replant the species that had perished, from DNA saved back

then. They were going to restore the earth, they thought, and then return everybody to their homes. It was a truly crazy plan; there was nothing needing restoring. Business was good, so long as nobody rocked the boat. So here was the secret, he leaned closer to Guardiano to whisper: when almost everybody was up there or on their way to live in GEO space cities, the Leroy Brown Society was going to raid the women about to leave, and put them in their harems; then lock down the escalator, preventing those billions of people from returning. The world was then all theirs, they win! The Leroy Brown Society would own all the resources of the whole world, for free. What a prize! So that was why they wanted the 3Musketeers crazy project to succeed.

So, Rationallo continued, it was time to also begin the planning for that new world of theirs, how to keep it running with so few people, while their harems built up a population big enough to fully do the job. To plan the way their traditions will be so purely applied to control the whole world, forever more. He took a big slurp of Brewstim, and sat back, satisfied. Life was good.

In his optional time over the next few weeks, Rationallo began to think about what was involved with the 3Musketeers' escalator carousel projects applications. There was opportunity for business beyond his dreams. Someone had to build the infrastructure to bring components for the cities made of lunar sourced materials. It would be a robotics factory that extended from the Moon to GEO, all of which would be opportunity for shrewd businessmen to squeeze for big profit. So what, that it would all go to waste, when the escalator was blocked after the people had all gone up there. The profit would be in the bank down here, in his pocket. However, how would he weasel in on 3Musketeers business?

Artisiana, that is how. She was still a wife of his, a wife-at-large, who had set up the new manufacturing facility that Idealiana had gotten to work again. Artisiana was his secret in with the 3Musketters bunch. A whole world of new possibilities began to open up to Rationallo's planning.

Artesiana was coping with her return to the directing manager's office, so recently vacated by her friend and boss Idealiana. She was cognizant that something big was in the works, that she herself was going to have to get important things done. That Idealiana was still alive but not to public announcement to anybody, especially that could get to the TANFL people's ears. Ears that were everywhere; TANFL left nothing to chance, they got data all the time from anything and everything, even over here in 3Musketters part of town. They all were going to have to proceed as if Idealiana no longer existed.

Yet Idealiana did exist in a way. She had left a legacy not just in a factory producing copious amounts of sliding armature segments that worked; but also the weird Holovision Presence thing. Walking into the office, she saw the place was strewn with a few things, scattered as Idealiana had made a frantic dash to the door of her office after the stroke hit; a coworker had seen the door open and Idealiana fall, and had called for the infirmary doctor.

Now, a bag of jellybean stimulants lay on the floor. Picking them up, Artesiana looked over at the mysterious Holopresence device's nook in the office, which had been added here since the office had been hers. She walked in and sat down in its chair, activated it. A sudden deluge of sensory impressions came seemingly out of nowhere; she touched the table in front of her, found it also in the new world of

impressions. In moments she integrated the visual and kinesthetic physical world impressions of the nook and its contents, together with the weird extra sensory-like impressions. So this was what it was like, a real trip. But what was it good for? It was a lot of work and expense just for entertainment, an escape from reality at break times. Idly, she turned on the terminal that accessed the manufacturing plant's monitoring systems, to catch up on the production data. Why was the terminal in here, instead of on the main office desk? As the terminal sprang to life, showing the schematic of overall production flow, she discovered that her new sensory impressions expanded into vast new worlds, which flashed into being as her eyes scanned over the parts of the production plant's schematic on screen. It was like the details of the area in which she focused her eyes, became pictured all around her in a time flowing three dimensional complex world all around her. There were grayed out areas, getting denser at the incoming material receiving dock, and gradually getting clearer the further down the production line the material went, until at one stage the armature segments suddenly sprang into being, when their material was combined with something in one of the production steps. And from then on, she could track that armature segment, no matter where it went.

In fact, she could sense bunches of the armatures beyond the plant, in delivery vehicles ... ships in the harbor ... in Ecuador ... and suddenly she could see them in a huge loop string, all around the planet, touching ground area in Ecuador and circling around back to Ecuador site again, on the way reaching high into space on the farside of the planet. So this was the space escalator carousel! And she could see it, somehow sense it, even from here. Amazing. There was another bunch of detail around the earth terminal site, lots of stuff. Apparently to be seen in this system,

things had to be painted with something; but after that, it was everywhere visible. Quite a show; she had not guessed that Idealiana had a craving for movies. She deactivated the device, and went over to her desk. It was the same desk she had before the miraculous return of her former boss. A boss now again almost as mysteriously gone again.

And she, Artesiana was now boss again. Manager of a production plant that had totally frustrated her before, making armatures that had not worked. But they worked now, thankfully. All she now had to do was make sure it all stayed the same, kept working, kept churning out those “3 mm sliding armature segments” that had gotten so much of her attention in the past year or so.

She sighed, managing was not her thing. She was a woman of action, a person that made things happen, and if possible excitingly, even artistically if possible. This office stuff was a drag. But it had to be done by someone; and she was the one to do it now. She resigned herself to a boring life from now on.

Going out to her other office to bring her belongings back to her new office, she found that the secret communication system had a message for her from her “husband”, she being one of Rationallo’s wives-at-large. What did he want? She moved her old office stuff in and merged it with the new office, then activated the secret communication link. And she discovered that her moments of boredom were to be few, as Rationallo had things for her to do. Big things, worthy of a woman of action, she could tell. For starters, she had instructions to go out and buy up all the land she could get nearby, to total 2 square miles. That was a lot of city space in which to do something.

She was paying more money for property than most of the residents had ever seen before, and they were eager to sell. And besides, better yet, she had promised that a new equivalent of their living space, stores and small manufacturing plants would simply be given new quarters as part of what was to be built there next. The area had been mostly slums and dismal stores and factories, populated by malnourished people fed by the secondary output of the digestion vats, laced with heavy metals and toxins which were not easily removed in the digestion process filters. The people ate it, rapidly accumulated the toxic stuff, died early, went to the digestion vats, and the metals and toxins thusly released went on to the next people to eat the stuff; a repeating cycle.

Before the bulldozers demolished each slum dwelling, Artesiana personally went to visit the original dwellers there, provided them identification as owners of a new home to built somewhere in the new complex, and paid for temporary shelter until that new home would be given them. Same treatment for each store owner and small shop; each had a ticket for an equivalent (or better) facility as part of what was to be built there, although probably on an upper floor.

One side of the newly purchased area bordered along one of the gateways between their side of town and the RichElite side of town. The gateways were opened at 6 in the morning and processed over 3 million workers crossing over to work in the RichElite factories, or as menial workers in homes. And the same gateways let them pass through at night, closing by 9 at night. Going through to the RichElite side, they were searched for weapons; going back to their side, they were searched for possibly stolen things. It was a dreary wait in line each morning for the crowds of workers waiting to get through the inspection gateways.

So Artesiana moved the shops and stores that were being built anew as part of her purchase agreements, to be placed along the route the workers had to stand to cross over each morning. The caffeinated jellybeans were a popular item bought by the waiting crowd. A place was provided freely where amateur musicians could play for the crowd, entertaining them. The replacement residences were built over the top of these small businesses. And in her overall design for the manufacturing facilities space per Rationallo's requirements, she added more living space on top of them, for more residents. She had an idea that Rationallo would eventually want more land bought, and more local workers to staff them, and she would need immediate homes for those workers and displaced people.

If Rationallo wanted to make a manager of her, she would be a Go-Getter type manager, she told herself.

But then, the managerial decisions suddenly got harder. Rationallo wanted a new gateway to be built, directly into the new facilities where it bordered with the RichElite part of town. The new gateway would operate in the opposite direction, to let engineers and managers come to work from the RichElite side of town. Artesiana did not think that the 3Musketeers Political Corporation was going to like that.

At the next meeting of the Board for the 3Musketeers corporation, Artesiana discovered she had new status. And lots of questions were asked of her. No longer just content with relief that new money was flowing to their side of town, questions were being asked as to purposes of what was going on, where was the money coming from, were there strings attached to that money. Artesiana told them that she was a wife-at-large for Rationallo, and was supplied with money to make a

profit making venture over on the 3Musketeers side of town. So far, it had raised the standard of living for a lot of workers, and had enabled the sliding armature segments to be built again, essential to the escalator carousel's success. She did not know what the new facilities would be used for, however; she had not yet been told. But she pointed out that she had steered the facilities to provide for the displaced residents and shops, and that she intended to insist that kind of thing be continued. All in all, it seemed a good deal for all concerned.

But the 3Musketeers board of directors were quite suspicious. Why would their arch rivals suddenly try to make them a success? Just to make them a better sport for their supremacy games? Was a kind of takeover in the works? Autonomy was one of the few things the 3Musketeers Corporation had been able to retain during the struggling years; and they would not accept loss of it. It would not be the first time that easy money from the rich had been used to lead the impoverished to their downfall. And it looked to them like Artesiana had a lot of easy money with which to play.

Then she told them of the demand to build another gateway, one that would allow TANFL engineers and managers to directly enter the new 3Muskateers manufacturing facilities, to provide engineering and management beyond the skill level of available 3Muskateers people, for a large new manufacturing capacity of undefined products. That threw the meeting into an uproar; they saw it as an invasion by the enemy, to destroy them from the inside out. No way, they declared. No way!

Back in her office the next day, she felt stumped, defeated. Resolving obstinate demands from opposing

sides were not her thing. During break time, she wandered into the Holopresence terminal's nook, and activated it, lacking clear path for something to do about the situation. Her expanded sensory system, now somewhat familiar with the ins and outs of the thing, wandered around the schematic of the systems and facilities of the building. She noticed that it extended to the infirmary, even to an odd area a bit through and beyond the infirmary. She discovered there were people in the holopresence! One was the company doctor. The other was ... her missing boss! Idealiana was clearly aware of Artesiana's intrusion, and she simply sat there and pointed at something, a bag of jellybeans. Stimulant break time? Artesiana remembered there was a sack of those things that had been dropped on the floor; she got them, and munched a few, while attempting to understand what was going on here. They had a slightly odd flavor. And so, within a short time, she became part of the Holopresence system too. And there, she could talk directly to her old boss.

They discussed the current situation. Idealiana said that it did not surprise her. Clearly, TANFL Political Corporation had some top people that were secretly hurrying along 3Musketeer's space escalator carousel project, for unknown reasons. It was reasonable that lots of things would need to be built to be sent up for construction of the many facilities to be built in GEO, once the carousel was fully sized. Should they look a gift horse in the mouth?

Make a deal, she said. Put up a little fight. Request being given that which it would take to educate 3Musketeer people to become capable engineers and managers as soon as possible, even to quickly take roles in the new facilities while they had on-the-job training to be fully capable engineers. Request that the

new facilities be built such that all workers always had new training in job skills beyond their current tasks, and education to broaden their knowledge, their perspective of the larger picture. And request that some jobs be created for some of the most impoverished and currently unemployable people among the slums of the 3Musketeers side of town. Use the opportunity to raise the standard of living and the skill capacity of people on this side of town, as part of the deal with TANFL.

Artesiana put the agreement before the 3Musketeers Board of Directors. What did they think? A lot of grumbling went on; they were quite battered from years of arrogant hazing by TANFL "winners." A tiger did not change the color of his stripes. Yet they already had seen a huge improvement in the lives of hundreds of 3Musketeers people, due to the sliding armature reconstructed facilities. People would be angry if they had to forfeit all that.

They began to see some wisdom in Artesiana's proposal: if they got people educated, higher skilled workers, as part of the deal, and a faster construction of the GEO facilities, they were willing to take quite a bit of risk of deception by TANFL. They agreed; now it was up to Artesiana to convince TANFL of the terms.

Again, this dealing was not her thing. She took time out, got away from it all, while taking the special paint that Idealiana had pointed out to her, and painted areas of the new, still empty, manufacturing facilities with it. It was at least doing something physical, even though it quickly became a bit dull to do. Eventually she tired of it, and went back to tackle the job of convincing Rationallo, a man who normally controlled everything, almost compulsively.

It was easier than she imagined. Rationallo seemed a bit distracted; he had a full time job over there, and was willing to let her do more of the managing; if the 3Muscateers crowd wanted higher skilled employees made of their own, it would make it easier to get the huge upcoming tasks done. It was a deal.

The new gateway portal was built, breaching through the wall that had long defined the boundary between the wealthy and the poor. It was built right into the new manufacturing facility, a special entrance made for the engineers, technicians, and managers that were starting to come over to work in the new 3Musketeers production facilities.

These new employees did not all look happy about going into 3Musketeers territory. At first they marched into the huge empty new buildings, sketched out plans for their offices; and per agreement, for each of their offices, was an adjacent one for an essentially ignorant 3Muskateers employee, who was going to learn to be an engineer, manager, or highly skilled technician. Part of the deal was that each of the TANFL engineers and skilled personnel was going to be a tutor, a teacher, for a companion 3Musketeer person. Many of the TANFL people considered it disgusting, degrading, even unpatriotic, to be teaching the “enemy” how to “win.” But Rationallo and Guardiano paid them well; and made clear those extra teaching duties’ importance.

Offices took shape, terminals set up, engineers sat in them wondering what next. 3Musketeers insisted on building anything they were capable of making, instead of importing from TANFL territory.

One of those things was the paint. The 3Muskateers people painted everything with their own paint. It covered everything, the office walls, the desks and

chairs, shelves. TANFL employees considered the 3Musketeers compulsive painters; a bit weird, but harmless.

The new huge buildings were sectioned off. The first one was assigned to design and build the next generation of sliding armature segments, for the next layers of the increasing girth of the carousel. 6 mm sliding armature segments, these. It was not quite merely a matter of scaling up the size of everything. The mechanical properties of the component materials remained unchanged, while the overall dimensions did change. Magnetic fields were limited by the saturation levels of the component materials; and the distance the fields had to traverse got greater. Shape of the designs thus had to change: the sliding armature segments had to become flatter, to adequately couple their fields to the magnetic levitation tracks, and to the couplers of the spacecraft that tapped momentum from the high velocity armatures. They, too, got the paint; except that it was modified and migrated into the armature surfaces, not just painted on.

Artesiana paid them all visits. She liked making the rounds, talking with peon and engineer alike. And she always seemed to have new suggestions for improvements, corrections for the fledgling designs being created.

Another section of the building was set up, this one for the tube tracks for the armatures. They had the magnetic levitation tracks built in, all an integrated assembly; with the sensing and control electronics for synchronous interaction with the passing of every high velocity armature segment sliding through on their way to beyond.

They kept track of the trends of changes needed with increase in sizes of components, which was used when the next increase was requested, 12 mm armature segments. These were quite flat, and were to be the final outer layer of the carousel structure, along which the huge traffic was to move someday.

Initial vehicles were next designed and built in more parts of the huge building. These vehicles had to operate at high speeds both in the atmosphere and in the hard vacuum of distant space; so they were streamlined. And until more confidence was established, each was designed to be a lifting body heat shielded glider; and had chemically fueled maneuvering thrusters built in, in case they had to be released from the carousel in emergency, and make their way back to the earth surface on their own, with their precious cargo.

There were limits to the sizes and weights of anything that they could build. The carousel could lift vehicles of limited mass; and the pathways up the Andes mountains to the tunnel where the earth surface terminal was located, were limited as to capacity. And this all established the sizes and mass of anything that got built to be sent up the carousel for construction purposes.

Next were built facilities for building more solar power satellites, scaled up from the original ones that now powered the carousel; and were also supplying electrical power to a few parts of the world for a good price. The carousel was finally providing pay back for the investment, at least a little bit.

Components for a prototype mass-spectrometer type total recycling plant was next most urgent. It was first used to recycle some of the most toxic of the digestion

vats sludge accumulation, and its component elements were completely separated out, including the heavy metals. Most of the thusly purified chemical elements were shipped back to the earth surface for new manufacturing uses, but some of the raw hydrocarbon components were saved and used in sunlit optically illuminated experimental chambers, where lichens, bacteria, and algae were putting the raw elements back into more complex hydrocarbons from which food could be made, free from all toxic contamination; this foodstuff brought the highest prices from the best restaurants in the RichElite section.

A small version of a Stanford Torus space Settlement was next built, using technology created for the earlier processing of biologicals for food; this first space city was mostly agricultural. Yet it also was of immense value in debugging the interaction of the myriad mechanical and living systems intermeshed in the slowly rotating city, a 1/2-gee inner surface only, due to its smaller diameter. Yet that artificial gravity was enough for people to walk in the gardens, plants to grow “upward”, and toilets to be conventionally useful.

It was time to look to the Moon, once again. The science that had piggybacked on the space race to keep the Moon from being used as a launch site for nuclear rockets aimed at other nations, back in the 1960's, had found raw material elements including those useful for making structural ribs, wall plating, glass windows, the major large components for full sized stanford Torus space cities of 10,000 people each, to be built not in L-5, but in GEO instead, appropriately modified versions of them anyway, first designs. The carousel itself would be quite busy bringing up people and their household belongings; so the major structural and passive shielding materials were best to come from the Moon, maybe eventually

some materials from the asteroids. The first GEO spaceport was built; from there the first manned lunar landings since the early 1970's were launched.

Lunar habitation had long been discussed, and so were built. Getting the lunar materials to the site of construction was a different task than that envisioned in the 1970's; O'Neil's mass launcher and catcher buckets were only one of the delivery systems considered. A wayward flung mass striking the carousel could be a great disaster indeed, however. So competitive designs were made, including the O'Neil mass launchers, the Mooncable anchored fiberglass space elevator through the Earth-Moon's L-1 toward the earth, and a modified space escalator carousel design for lunar use.

There was tremendous pressure for what to do next with the transportation capacity of the carousel. People all around the world wanted more solar power satellites, to beam abundant cheap clean electrical power to them, to power their digestion vats for cleaner foods, as well as power all their daily life things. Others wanted more total recycling plants built instead, to clean up some of the most offensive waste accumulations on the ground; even to provide materials for a fantasized totally clean living-space area the richest elite wanted built, and now theoretically possible. Others wanted to finally make a manned Mars expedition, fully equipped in huge vehicles efficiently launched from the high GEO spaceport. And still others craved to get going on building the full 1-gee interior surface self-sufficient cities in space.

A dozen years had gone by. The entire 3Musketters quarter of the city had become built over by the manufacturing complex, with fine living space homes built atop the manufacturing levels; every person in the

The Ark of 1984's Future

previously poverty stricken city was now educated to their best capacity and multiply skilled, and no end to the demand for their work.

Chapter 11 Building cities in space yet

With the 3Musketeers Political Corporation's huge financial success quite obvious, as it began to sell high quality clean abundant electrical power to several countries around the world; and payment for total recycling of some particularly noxious toxic industrial wastes; and even providing nutrients for food that did not come from the digestion tanks and sold to the RichElite who could afford it, the TANFL political Corporation also decided to get into the space resource businesses.

Since the transportation fees that 3Musketeers charged for lift to GEO along their space escalator carousel were low, TANFL had the makings of a free-fall hotel hauled up into GEO, and soon were getting a good return on their investment by visits from the RichElite who went there for the unique experience of staying a few days in free-fall and cozying up in view of the universe night sky from GEO.

Although for quite different reasons, both TANFL and 3Musketeers wanted those big cities built in GEO, to provide living space for the earth's peoples. The escalator carousel was running at capacity already, and would be more needed just to lift people and their household belongings to GEO, if there were new homes there for them to live in comfortably. The political complexities ongoing in Africa had so far precluded the construction of a second escalator connecting there; so the decision was made to make the Moon the primary source for materials for constructing the ring of Stanford Torus type cities around the Earth in GEO. The RichElite of TANFL Political Corporation were well educated already, although they did not have much real job experience as

there was little for most of them to do in their part of the city. So TANFL decided to take on the job of providing lunar-sourced components for the construction of the primary structure of the Stanford Torus cities in GEO. Clearly, there was lots of money to be made by creating and selling that real estate in GEO, where people could live in well designed total recycling mode, and even create pristine environments for re-created nature settings, presumably to be used as seed stock for replanting a cleaned-up earth surface. This became the dream not only of 3Musketeers but of most of TANFL people too, to create this new kind of Ark to re-seed the renewed earth with life in future wholesomeness.

The Leroy Brown Society part of TANFL had its secret other purpose, of course. Yet it too needed that ring of cities built up there, and as quickly as possible. So, essentially everybody was united to this task.

There was to be much robotic assistance involved with the mining, materials processing, and subassembly manufacture, all to be ready to be robotically plugged together to form the hollow wheel shell for each 2-mile-diameter Stanford Torus city, to eventually be home for 10,000 people each; much as the earlier 1976 design intended for use in L-5 envisioned. So TANFL converted over most of its manufacturing facilities in 3Musketeers part of the city, to the design, prototyping, manufacture of components for those wide-variety robotic assistants to be used in space and on the lunar surface.

Getting those subassemblies from the Moon to GEO was another task yet to be solved. A lunar escalator carousel could only loop around the Moon from its farside to only as high as L-1 without going into a structural mode involving tensile stress in the lunar-

stationary part of the structure. The stationkeeping tasks for catchers involved in the O'Neil type mass driver materials delivery from the lunar surface had not yet been resolved. An escalator carousel anchored to the lunar surface on the earthward side of the Moon, would be able to reach to an altitude higher above the Moon, but not beyond the balance point where the centrifugal force from the moon's orbit around the earth equaled the amplitude of the combined Earth and Moon gravity at that point, without the structure needing to use tensile strength of its stationary track materials.

So the decision was made to build an anchored lunar tether space elevator through L-1 (the balance point between the Earth and the Moon), and build facilities at L-1 for fabrication of the larger subassemblies there in free-fall balance between the Earth's and Moon's gravitation pull forces. From there, the large subassemblies would ride on down toward the Earth, carried on captive tractors that electromagnetically braked along the tracks attached to the tapered fiberglass tether, which would convert its kinetic energy into electrical energy poured into the conductive tracks, which would then be conducted over the tracks to the lunar side of the tether, to assist in raising up the materials for more manufacturing at L-1. Reaction engined powered freighters from GEO would rendezvous with the subassemblies as they were released from the tether's captive tractors, and the freighter would then use rocket power to deliver the subassembly to the ongoing construction site in GEO.

The whole task seemed enormous, yet doable in the immense space environment. There would need to be an ongoing construction of those space cities in GEO of huge proportions. To get the major part of the world population up there within 20 years, the space carousel

escalator would need to move a million people a day, with their cherished belongings, up to GEO; and the lunar-sourced construction of the basic cities for their homes would need to be built at the same rate of a million homes per day. But robots could be built in space of almost any huge size; and the energy pouring out from the Sun up there was ever ongoing, captureable to the task of powering those robotic construction systems.

Transporting a million people a day from all over the world, to be funneled into the Ecuadorian Andes tunnel embarkation port to GEO, was also quite a task, especially to a world which had been energy starved for decades prior to the startup of the escalator-emplaced solar power satellites. Now abundant clean energy was returning to sites all around the world; yet the devices that could use that electrical power often had been discarded or simply worn out, and so they too had to be manufactured.

Slowly, the world began to look again like an energy-wealthy world, but it took time to do so.

There was too much going on that was new and unfamiliar to people, all this manufacturing of new kinds of things for use in space, and the doings out there, some even beyond GEO. The making of unfamiliar objects, from the tiny "3 mm sliding armature segments" to the curved panels with integral rib sections that fit together that made a hollow wheel two miles across, and inside was 600 feet across around its circumference, were not the arenas of thought of even a decade before. There was a lot of sending back of pieces that did not fit together correctly, for example. Two of those huge panels had collided during assembly, bending both of them beyond any way they knew how to repair, up there in free fall without a solid

place to stand and a hard vacuum awaiting nearby. So they had no way to send them back either, so they were set aside until they could be sawn up into small enough pieces to go through the solar powered total recycler.

The Holopresence monitor was ever a way to intimately check how things were going, as its special “paint” was now used on all things in the system. Yet even it was not adequate for the time when a steering thruster ran out of fuel as a freighter was bringing a load of panels from the lunar plants to GEO. It was quickly clear that a collision was going to take place, but there was no rocket fuel where needed at the moment, so all the Holopresence could do was show the rapidly new inevitability. It showed the projected trajectory, it was going to ram one of the full sized solar power satellites in GEO which was beaming power to a customer nation down below. A message was sent to that nation to sound alarms and shut down machines and vehicles that depended on electric power, open doors that would only open electrically; little of it got noticed in time, however. The freighter with its loads of panels rammed the power sat and bounced off, both shedding fragments and knocked out of orbit, headed toward the ground. Down on the ground, suddenly a nation found itself without power to do much of anything. Worse, the trajectories of the freighter and the ruined solar power satellite were projected as best possible given their ragged shapes and tumbling. Their meteoric fireballs were visible far away as they plunged to ground on the night side of the planet. They hit at the eastern shore of Brazil near the Equator, one on land and the other just offshore, one creating a local tidal wave and the other a mushroom cloud fireball, setting the jungle on fire for miles around the impact crater.

Reparations to Brazil and its people took a chunk of what would have been profits. But most of all it clearly showed the problems of huge things being built up there, which eventually will surely reach ground, if only in hundreds of thousands of years. How to deal with that problem? Preventing orbital decay was the new focus of attention; some push on a solidly connected ring all around the planet in GEO could couple some of Earth's rotational energy to maintain the angular velocity of the habitat ring; yet that ring would be flexible, and so orbital decay of the cities far from the escalator's site had to be prevented more directly, by a bit of reaction motor thrust, very small but requiring loss of a tiny bit of mass in doing so. Hundreds of thousands of years would use up a lot of mass, however; and besides, the reaction thrust system mechanisms surely would not work autonomously that long, none of them failing. Would someday in the far distant future, all their huge cities in space, the big power satellites and total recycling plants, all come tumbling down on a sleepy unsuspecting earth all around the equator? Would it spread a dust storm far and wide, disrupting the weather system like a huge volcano and worse? These things were pondered mostly by the 3Musketeers people, since the TANFL people only considered the cost of things that get dropped in the very near future.

Would it be wise to design the big structures in GEO to break up and pulverize high in the atmosphere, becoming dust and small fragments to cloud the world's air; or would it be better to design them to stay mostly in a solid lump that would go wham and make a crater, throwing up dirt into the air along with fragments of the impacting machine?

They finally settled on a design philosophy that drew from living things, ones that continuously had

circulating nutrients, which as in the human body rebuilds nearly all cells over once every seven years. If all the space cities and power plants, everything up there, were designed to be continually taken apart and rebuilt over and over again, the designs could be made better with experience over time; and if a time came to abandon the ring of cities, then they could be taken apart bit by bit and brought down the escalator gently and rationally stacked out of the way.

So a major redesign was begun, to implement this new basic philosophy of continual take apart in place and rebuilding on the spot, bit by bit, on and on. It was full structural maintenance, requiring that at times things be moved out of one area to another. Eventually it was decided that not all things would need to be taken apart every so many years, if it was still certainly in serviceable shape; yet all parts had to be capable of being taken apart and taken to the earth's surface gently and intelligently.

Chapter 12 Back to the Moon solidly

Back when the first GEO SpaceDock became operational, it was first used to build the initial spacecraft for the return to the Moon. It followed in the footsteps of Apollo, as it was the first manned landing since the early 1970's. There had been some talk about a return to the Moon as part of a Mars adventure previously, but it was set 20 years in the future from then and so had been forgotten in the world energy crises, especially when someone in Congress had pointed out that the fuel for even one launch would consume the fuel that would heat the homes of 3,000 people who would therefore freeze to death, the talk of a Lunar and Mars project was mentioned no more.

But Apollo had a pattern that was being followed now, in that there were to be portions of the first expedition that would stay in orbit around the Moon, while the rest traveled in a separate vehicle to the surface, did their work, and returned to the orbiting spaceship for return to Earth. But it was very different from Apollo in that it started from GEO level, and the trip would end there too, no fiery reentry involved. Twelve people would descend to the lunar surface, while a token two would remain in the transfer craft. Since the energy change from GEO to Lunar Orbit was very little, the mother ship was immense, unlike Apollo that had to lift all from the ground.

Idealiana was one of the two to remain in the mother ship in orbit, while Artesiana was one of the twelve making that first return-to-the-moon landing; Artesiana would not miss that adventurous opportunity for anything; she claimed that she deserved to be on that expedition as reward for her work getting the sliding armature segment production going again.

The lunar landing craft was immense, too, as compared with those of Apollo days. All but the transfer shuttle was to remain as their initial Station Base 1 when they left, and had been built to serve as a shirtsleeve environment for the crew when they were not out working on the surface. It had facilities built in nooks, ranging from a Holopresence station, to gourmet cooking kitchen, to a copy of the library facilities nearly equal to that on Earth, in case of severance from Earth for awhile, they at least would have access to the best of knowledge so as to survive. Besides, there would be unknowns to face, despite all the prior research and thought done previously.

Outside, the crew set up high capacity com links to GEO SpaceDock 1 and to Earth directly. Then they put up a mirror solar focusing furnace set, for several temperature ranges and crucible sizes. Solar cell panels were set out to supply electric power directly to the facility, mounted sufficiently high so that most of the dust kicked up would not find its way to them. Three-fourths of the solar panels power went to storage, for the long Lunar night's functioning, maybe sheer survival if things went sour.

One of their purposes was to raid one of the old Apollo sites for technology that had been lost. The intent was to leave the other sites alone for historical reasons, and even this one would be kept to some extent. But there was technological knowledge built into the gear left behind by the Apollo astronauts, devices that had been built with knowledge and technology, even some materials, that was now unknown. Some of the recovered hardware was to be evaluated in the engineering facilities of BaseStation1, the rest to be taken back to GEO SpaceDock1 and from there to the earth surface for more reverse engineering to be done.

Next to the StationBase1 landing craft, they used a lunar backhoe to dig a trench sloping away from the craft's base, then dug a huge pit 7 meters deep. In this pit they laid a flooring of basalt blocks clear across the pit. More basalt blocks were laid up as walls that were formed as connected domes, to form compression structures, as they had no metals refining ability yet for roof beams. Once the blocks had been assembled, their junction edges were sealed by a molten glass bead, welded onto the basalt by a high power laser, inside and out. An arching tube went from the larger dome, to under the StationBase1, and was connected through airlocks. The inside of the closest dome was sealed against leakage, and soon was part of the shirtsleeve environment of an expanding StationBase1; it was buried under lunar regolith, becoming a haven from high energy particulate radiation, especially when the Sun might have sunspots acting up as it did periodically. It was still unshielded on the end where construction was still going on; but being in a deep pit to start with, there was adequate passive shielding.

Soon after most things were built there, the special Holopresence paint was applied to them. Up in the orbiting mother ship, Idealiana spent all her time in the Holopresence nook, continually flitting her consciousness around in the growing lunar base station, sampling this and that with virtual senses. occasionally she also would flit her awareness around in her own mostly vacated environment, making sure all was well there too. One of the reasons she stayed on the mother ship in lunar orbit, was that TV cameras were sending newscasts to the people on Earth, like in Apollo days that similarly had eager eyes to share in the adventure.

But the orbiter was considered boring, no newscast cameras there, and so Artesiana felt safe from

recognition there. She had a new identity on record, but it was conceivable that Rationallo was watching the Lunar adventure newscasts and might have recognized her. Even though the entire space effort was conceived as being for the purposes of the 3Musketeers people, it took the educated personnel and wealth of TANFL people to make it happen. Although this venture of 14 people were all 3Musketeers people, most of the equipment had been paid for by TANFL, and they expected a return on their investments on the project. Once it was established that the lunar StationBase1 was a safe and comfortable place to live, TANFL people were going to start arriving to share in it, making sure their investment was going to be a continuing success. And to have new adventure to brag about when they returned home.

But for now, it was all 3Musketeers personnel that had their lives on the line, making the project happen. Many of them had intense education in the sliding armature engineering facilities, OJT alongside paired up with a TANFL engineer as tutor. Now they were on their own, out here on the Moon.

As the heavy construction phase wound down, smaller projects became online. One of them had been created by Idealiana, and Artesiana herself took it out onto the lunar surface and activated it. Shaped as a half-section cylinder, half the cylinder was transparent glass, through which sunlight would flow; from the opaque half of the cylinder, a shield would rotate over to block the glass, during the long bitter cold lunar night's 2 weeks at a time. An airlock was at one end, through which Artesiana entered once the structure was assembled and pressurized. In it were Quinoa seeds, planted in soil from their native environment on Earth. It was a miniaturized space farm, to see if vegetation could really be grown on the Moon, even in the best of

conditions. Quinoa was able to repair its own DNA when damaged by radiation, enabling its survival in the high mountains of its native habitat. It also was considered the mother corn from which domesticated varieties sprang. What would it do here on the Moon? If it survived and propagated in this enclosure, some of the resulting seeds would be put in a similar enclosure, but using a soil derived from the lunar regolith. Where it would all go would depend on what happened in the previous steps, and it all would take time to explore, that is how the project got authorized.

Their real food supply, as now normal on Earth, was to be from a digestion tank that was soon set up in the subsurface igloo system's facilities; and into it were placed their accumulated organic wastes, and even the wastes that had been left at the Apollo site long ago, was added to it, nothing going to waste. A large tracking periscope mirror system brought sunlight to the tank during the lunar day; then most of it would be shut down during the lunar night, just a biological start small area of the tank would be kept growing by battery powered lighting during the 2-week night. Most of the food had been brought from Earth, sustaining them until now, and so the digestion tank would only be needed for the 4 people who were to remain staffing the facility while the other 8 people would return to the mother ship and all would return to GEO SpaceDock1, according to plan.

After several months, the TV watchers on Earth tired of watching the now routine construction and operation activities of the lunar station, and so all but some of the external news cameras were shutdown and packed for return to GEO SpaceDock1. To them, adventure was over, back to their usual watchings for news.

Things were happening on Earth, too. Rationallo became head of the new TANFL Space Enterprises, for one thing. And he had an urge for some adventure, and to learn about his new business first hand. Several smaller orbital transfer vehicles had been built at GEO SpaceDock1 after the lunar expedition left, and Rationallo gathered a crew of three, announced he was going to visit the lunar expedition's mother ship, and find out what it was like first hand. They would occupy the 4 spaces vacated by the four people who were going to remain at the lunar base, when the mother ship returned to GEO. Word of this impending visit quickly got to Idealiana.

The various works in progress at the lunar StationBase1 were quickly brought to a stable point, and it was decided to head back from the Moon. All 12 of the station personnel rode up to the mother ship in orbit around the Moon, where they all had a great farewell party. Then the lunar transfer spacecraft returned to StationBase1 site. But this time one of them was different. Idealiana would stay at lunar StationBase1; one of the original permanent staff would instead return to GEO. That way, Rationallo would not discover her, she hoped.

Rationallo arrived at the lunar orbiting mother ship to find it already full of the staff from the newly built lunar base, who were ready to return to Earth. He had to content himself with a tour of the mother ship itself, and meeting with the staff and crew. Surprised to meet up with Artesiana, one of his wives-at-large among them, it was opportunity to catch up on news of how she was doing. He had last seen her when he gave her the responsibility to rebuild the factory that was needed to build the 3mm sliding armature segments; she clearly had done wonderfully on that assignment. It had been key to making this very adventure possible.

He had wanted to tour the lunar facilities, but the timing was wrong for that, the transfer vehicle was already back on the Moon. He was irritated; timing was normally perfect for him, a sign of his management powers. Something was a bit odd. His tour of the ship found a curious nook, that Artesiana said was her personal space. It appeared to be an information terminal of a type unknown to him. He always made a point of making everything known to him: there were to be no surprises, definitely.

Show him, he demanded of Artesiana, of the Holopresence nook. Artesiana had only the day before arrived at the mother ship, and was improvising on pretending to have been doing the tasks so recently vacated by Idealiana. The Holopresence nook had always seemed a magical strange place to her, and no way to make it into something else now; or was there? She explained that it was a break time entertainment device, by which she could escape from the awareness of the drudgery of the day's tasks. What was it to him? Surely he had no time for frivolities that the 3Musketeeers could indulge in. She offered him a bit of wine that they had been able to make, another of their frivolities, she said.

Well, OK, a bit of wine, he agreed. The wine downed and felt, he again felt curiosity at the entertainment nook. He could only make love with his number one wife, and so Artesiana was off limits; but he wanted a bit of this new entertainment device, best he could arrange for now, he decided. Turn it on, he said, show him some entertainment on it.

Artesiana complied, and sat in the nook, to search for something, she said, that might interest Rationallo's intellectual powers. Activating it, she found herself aware throughout the mother ship, and more, also

throughout the lunar station far below. And idealiana was there, in its Holopresence terminal. Aware of what was going on in the mother ship, Rationallo and all.

The library, Idealiana advised Artesiana, connect Rationallo to the library, where the Apollo science was stored, all about the elemental composition of the lunar regolith, for example. Idealiana would be the hidden librarian from then on: put Rationallo on, she said.

Here is the library on our heritage of lunar materials science, Artesiana said, as she positioned Rationallo in the Holopresence terminal, and activated it.

Rationallo thought that this indeed was good wine, and the entertainment very well done. In fact, he had never before found information on lunar regolith so full of presence, so lively. He was really getting into the experience of being a process for extracting aluminum from lunar regolith, when it faded and he found he was in a curved structure, looking out through a window on the lunar barren wastefulness; yet inside were some small plants, growing, soaking up the sunshine. Suddenly he was a Quinoa plant, a creature that knew how to grow stem, leaves, even in a high radiation situation, like here on the Moon. And it felt of the joy of life.

Rationallo woke strapped into a free-fall sleeping bag. His head hurt a bit. Wine, yes, he had too much wine last night. Other people were getting out of their sleeping bags, time to get the day going.

He marveled at the efficiency that these 3Musketeer people displayed as they prepared the orbital transfer mother ship for the return to GEO SpaceDock. Weren't they mere 3Musketeer scum? And actually, he suddenly realized, his life was in their hands, as he and

his crew of 3 were along just for the ride. He paid more intense attention to their doings.

Three days later he was at GEO SpaceDock1, and in another 6 hour's ride on the space escalator carousel, he was at the Ecuadorian Andes Terminal, back on the ground.

Guardiano met him there. Guardiano would not go into space; he declared that he was intended to be a man of the earth, and would stay there. Yet he acknowledged that space was a place, a resource that affected the Earth. And now not just as a source of solar energy and a place for communications satellites to hang out, but a place of busy commerce, up there. So what; he asked to no one, it all is just a gameboard. And the traditions are the finest of rules; but he was not sure that the space ventures were fully in compliance with the rules.

Didn't Rationallo understand that it was a world of people, he asked, a bit too much alcohol imbibed. Glad to see his friend Rationallo again, and in their favorite nightclub meeting place, Guardiano pursued his point. It was a world of people, and all else mere stage props, of no intrinsic value. It was only people that counted, and they had to establish a hierarchy among themselves; that hierarchy was the map of this world. The map showed the paths from anywhere, anyone, to anyone else. That is the playing board, the world of what really counts, all made of people. Who does what to whom, is the only law of this social land. And the social land, the hierarchy, is all the difference there is between raw nature and civilization. Do you understand? ... he demanded of his friend Rationallo, who was again a bit bleary eyed from a bit too much alcohol. These drinks, they were getting to overwhelm him, he thought.

Rationallo was of the opinion that it was not so much the people that counted, it was the knowledge they had accumulated, and their ability to utilize that knowledge to control the world. Guardiano's opinions were a valid part of that body of knowledge, true. And so were people and their aspirations.

He thought of Artesiana, her world of physical doings; that was what counted for her. To thrive on this earthly place, full of action, yet in an intelligent way, that was the spice of life, she portrayed. And carried that on into space, wherever there was stuff, and things to do with it, she could make life happen.

Yet here was his best friend, Guardiano, declaring another kind of world. Was the world of people really the world for him? Nothing else in it except props? Artesiana's world of vigorous physical thrivings; his own world of the powers of knowledge and planning. And maybe there was some substance to that wench Idealiana's world of imagination too, it took all the pieces of a pie to make a pie. And yes, the world of people's status relationships, that too was a powerful place; for without it, only nature ruled: the waves lapped on the seashore, the wind howled in the canyons, the beasts hunted in the night. People surely decorated that scenery quite interestingly.

Chapter 13 No one to push the button

There were a lot of things to do for the four who were now staffing the Lunar StationBase1, yet mostly was monitoring the experiments set up by the larger crew. However, the need to suddenly leave the Moon, due to Rationallo's impending sudden visit, left several major tasks yet to be set up and started. Most important perhaps was the aluminum extraction and processing system; structural components for the GEO space cities were to be mostly built out of aluminum coming from here on the Moon.

In fact, the task was such that it was to require four people out on the surface at once, to carry and set it up. So all four of them left the station to be outside at the same time, a situation felt quite unwise; yet the only other choice was to fail to have that important experiment set up and going, waiting until the next expedition here. Rationallo, among others, would demand to know the sequence of causes of the failure to speedily get that experiment going.

So all four were out tugging and pulling on the wheeled apparatus, an automated chemistry lab that would putter along the landscape, scooping up lunar soil samples and subject it to the two lunar ore processing paths built into itself. It first had to be gotten out onto the landscape and into the sunshine for power, and aimed generally in the direction it would continue to go. They were all out there, fairly exhausted but successful in positioning the huge ore processor and activating its startup sequence, when someone remembered that the station's airlock had to be activated from the inside of the station.

It had been assumed that the station would always be manned, and that the station manager on duty at any

given time would need to coordinate the opening of the airlocks with whatever else was going on at the time. But as of this moment, no one was in there, to activate the airlock sequence.

The aluminum ore processor having been started up and now moseying on its way, the four space suited people searched around the station's airlock door, but no, there was no opener that anyone knew about. Usually 3Muskateers made things to operate in multiple ways, as they realized they could not cover all contingencies; but this case, no redundancy could be found. They all retired to the Quinoa experiment hut, which had its own small air supply system, though mostly to extract oxygen produced by the plants when they were growing well. At least it was something Artesiana had created with extra loving care, a place to go to relax at times. The four conserved their space suit oxygen supply, relaxed in the warm sunlit greenhouse with the tiny Qinoa plants. All thinking, thinking of what to do next.

After a couple of hours, one noticed a light blinking; it was next to an audio plugin. Connecting to it, it was Artesiana, now at GEO SpaceDock1. "Just out of curiosity, may I ask why all four of you are wasting so much time in my greenhouse?" she asked. She had spotted them there when during break time she thought to use the Holopresence nook to look in at her cherished experiment, and found them there. "Can you remotely activate the Station's airlock from over there?" they asked a bit frantically. No, the activation switch was a manual pushbutton, inside the Station. Artesiana was able to use the Holopresence to explore through the now-deserted lunar StationBase1, even though all the TV cameras had been removed from inside. Artesiana also warned them that one of the TV camera robots was slowly headed their way, and soon would

be in position to peer inside the greenhouse; apparently one of the news services had spotted their somewhat odd behavior, and was going for the news.

All were now physically rested up, so it was decided that two would remain to be seen tending the garden when the TV robot arrived, and the other two would be over by the airlock to the Station. The TV robot could not be in both places at once, and hopefully would not notice the two looking a bit forlorn at the airlock that was not opening for them.

Artesiana was working on getting the robot floor sweeper in the Station, to get over and bump into the airlock door switch. If she succeeded, someone would have to be there to get in immediately, thus the need to stand around there by the airlock door.

Artesiana was coaxing the robosweeper into action, depending on its decision making ability that normally was used to decide what needed to be swept up, vs what was legitimate stuff there. She could use the Holopresence to create flitting shadows in the view of the sweeper, and was trying various patterns of shadows to ascertain which ones got attention enough to initiate movement. Eventually she had the robosweeper weaving along the floor generally in the direction of the airlock switch, back and forth; it had its own ideas as to how to respond to the shadows, however. Eventually, she got its handle to bump into the airlock door pushbutton, and initiated an opening sequence. The airlock opened, the two waiting people scurried inside, took their space suit helmets off, and breathed a sigh of relief.

One called the Quinoa greenhouse, advised them of success, and to stop putting on a show of gardening tediously for the robot TV's amusement. Time to

casually make their way back home, the candle was lit in the window and the door would open for them.

They agreed that one of the needed next steps was to put at least a hidden airlock switch outside the Station. It would have to be a radio operated switch, since there was no way to bore a hole through the basalt blocks, through which to run wires to the outside. And for longevity, it had to be a battery operated transmitter, charged by solar energy during the lunar day, to be useful all through the 2 week lunar night if necessary.

Chapter 14 Our creature companions

However, the Radio Frequency signal would have to be coordinated with other base operations, to make certain it did not cause glitches in commands or data acquisitions. Perhaps instead was a “911” kind of system that could operate even without humans inside the station?

Idealiana got in her Holopresence nook and initiated a holographic design processor, and began to create a schematic of the new 911 system. As virtual hands and eyes manipulated the virtual drawing tools and analytical math systems, with subroutines continuing to operate when the attention moved beyond their setup, a space-time equivalent of the new equipment quickly arose in the Holopresence chamber. It had to be built with the spares on hand, which factors progressed through the design. That which could be created with available resources was highlighted, and that which could be made possible or better, showed what needed to be requisitioned to be brought in subsequent supply missions to the lunar StationBase1. Fortunately, with cheap electrical lift to GEO, the transfer vehicles from GEO to the Moon could be absolutely huge, lots of cargo space for all kinds of things, including a variety of animals and vegetation.

Artesiana found time to relax in the station's pet facilities. Long before, it had been decided that animals and plants were necessary for companionship of people in long term residency far from Earth, maintaining a deep kind of psychological health for the crew. Letting the creatures reproduce within controlled conditions, provided data that would be important later, too; including levels of needed genetic diversity. They had species diversity, although lack of ecological balance was a particular concern with these; just to

have freshwater tropical fish in a tank, toads in a small pond, an ant farm, several parakeets and quail, green iguanas, miniature lop-eared rabbits, housecats and small dogs. The carnivores were separated away from edible neighbors. This experiment was not to supply food; although data from it would be useful later when livestock were imported for food. The Quinoa greenhouse was the initial setup for vegetation, other than a potted vine in the living quarters; one of the things to be built soon, based on early results with the Quinoa greenhouse, was a large greenhouse to grow fresh veggies, and grain for some of the pets.

The basic hydrocarbon waste processing was still being done by the standard Digestion Vat process. They had only the basic food processing facilities so far, drawing from the raw moosh of the vat, and growing from several cell cultures, including beef muscle, turkey muscle, watermelon fruit, peach fruit, corn kernels, grapes. A bit of beer and wine was fermented from these as secondary food products.

Chapter 15 Technology, life and the Moon

In the Holopresence nook, Idealiana pondered the way the holographic system was created. It was not a linear process; maybe most things weren't either. In this case, it began as a search for ways to define holopower: the overall energy and influence under the control by any given person at any instant. A person piloting a spaceship, for example, has the kinetic energy of the craft and its velocity direction, and potentials for course and velocity changing, and potential effects of those options. A person walking from one room to another room has the kinetic energy and velocity vector of his/her own physical body, plus all possible things he/she could do or say at that instant and their interactive ramifications with the surrounds including social world. The search for ways to describe those comprehensive potentials, resulted in the early forms of that which became depiction of totalities that eventually were used in the holopresence technology.

She pondered the elegant solutions that were made during the creation of the Holopresence technology. Solutions to a problem can be so perfect that its applicability is so instantly apparent that the person hearing of it instantly forgets that he/she did not know of that solution before; it is as if surely all people must have known about it all along. Unfortunately, this means that the one who derived that elegant solution, often gets no recognition for the achievement. Particularly so if it was a spontaneous, unassigned, problem that was solved; and if the problem was to have been solved by a "superior" then the achiever of the elegant solution is likely to be considered as obnoxious or worse, by the "superior" and ilk. Sometimes she thought there was a "social world" in which some people lived in, devoid of physical materials or even imaginative essences. Just people,

and people's doings within a hierarchy pyramid, organization charts being all that was real to them. The rest of reality was mere game-board to those people. Could that really be?

The wife of the technician at Ecuadorian Terminal was Idealiana's source of the technology, and had probably been a major contributor of those elegant solutions. What a severe environment to be raising a family and being technologically creative too! That new high Andes Mountain tunnel, so early in the creation of Earth's Station. The immensely complex interactive systems that were involved then, while so many things were being tested on the space carousel escalator, with all its monitors and automatic reflexive safeties. How to comprehend them all to the human mind? She had the inspiration, and her husband's technical expertise put it to use, and away it went. It took a lot of testing and confidence-growing before it replaced the huge racks of old electronic equipment monitors permanently.

The ability to interface with the holistic part of the human mind was perhaps the greatest part of that achievement. The special paint that radiated the presence of whatever it was on or in, an accidental discovery that to most people would have been a bit strange but quickly forgotten, instead of seeing the potentials in the somewhat odd events then. How fortunate humanity was to have such people in it, and the sufficiently supportive surroundings to enable their insightful explorations prosper.

Severe environments ... the one she was now living in, surely could be called that. The lunar landscape had hosted a few brief visits by pairs of men long decades ago; but otherwise had not been blessed with the presence of life, as far as anyone had found. No one had ideas about putting an atmosphere and oceans on

the lunar surface. Yet she believed that life could dig in here, maybe having better luck than the Mayflower folk.

Was the big problem that people were never naturally able to all go gung-ho to work together to make something happen? Unfortunately, it seemed that there were always lots of guys who simply could not see beyond the “who is better than whom” endless contests. And the “bully” urge to gather a bunch of others around subservient to the bully, had been reproductively successful for vast eons of times, and its modes maybe were genetically wired into those people; and all they saw was power games, and let others do the maintenance of survival stuff for everybody ... including for the bullies who seemed to have no comprehension of their responsibility to provide for everybody’s long term survival. “Parasites!” she scornfully thought to herself, once more, re bullies.

That circle of thought was one she had gotten trapped in as if a whirlpool many times before. She wandered back to the pet farm,

These little creatures did not ask to be here. Was she doing them a service by bringing them to this place, from which there was no possible escape to a livable haven, out there in the lifeless barren hot-cold airless waterless lunar landscape? She had insisted in only taking animals that were leaving behind siblings, in case her venture did not survive. There were very few animals still existing, since the big famine that resulted after the collapse of the environment; and people all over the world ate anything they could get. There were no cattle, sheep, elephants, or their animal kingdom brethren alive in the wild anymore; most of the zoos had their animals eaten too by the starving hordes; and only a few animals that had been house pets of the wealthy had survived. There were cell DNA banks for

cattle and many other creatures, saved in desperation, yet no real plan to bring them back to life on the earth surface when all was in place. So Idealiana had this little animal pet farm created, and she had dreams of return of livestock and agriculture galore in the Stanford Torus cities planned for construction in GEO, largely from lunar structural materials. So she hoped there would be room for her animal friends there too, and this was a tiny Ark for a few of them, just in case things got worse on the Earth. Yet her justification for bringing them along on this initial lunar establishment was not acceptably based on the psychological benefits to people, nor the preservation of genetic material, but rather she had convinced the powers that be that it was a viable way to bring along well balanced hydrocarbons for the digestion vats. She thought it would be one more tragedy if that were to actually happen here, except at the end of their natural life spans.

She was still in the pet farm after the station shut down for its earth-normal circadian cycle sleep time. Her parakeet friends were flying loose; there were six of them. Suddenly she thought about the three-dimensional awareness mode of birds in flight. What would they do if they imbibed some of the holopresence paint? Would it sicken them, too? One male parakeet liked to sit on her wrist a lot, and she idly offered him a bit of paint-added birdseed. She put him in a small box and carried him through the darkened passageways to her Holopresence nook, closed its door, and set him free.

At first the little bird acted with alarm, all the unfamiliar things suddenly in view. But then he realized Idealiana was calm, and began to courageously move around in the merged physical and holographic world superimposed. Soon he was making chirpy comments about places he saw that he had been to see

physically. And when it connected to Artesiana in far away GEO SpaceDock1, as if here, he seemed joyous to greet her, as she had put together the little pet farm herself. And when he was shown how to peck at the controls to guide the flow of place to holographically be, the bird's territorial brain quickly became at home there, off on his own explorations. From then on, Idealiana brought him there as a buddy, when she was using the Holographic presence nook to check out the station's multiple systems; and occasionally he spotted an inconsistency before she did. Then she set him up in a well-fed and watered cage to stay in the nook even when she was gone, having trained him to peck at an alarm switch that would alert her to something needing her attention right away. This little guy was now functioning as a crew member. Maybe some of the other animal pet farm critters could use their characteristic natures and the "paint" to also perform valuable duties, that would free up some human attention. Hadn't dogs once performed watchman functions way back in human history? And cats ... if she could program the holopresence to have process flow malfunctions resemble mice to be caught

A few days later, telemetry from the wandering aluminum ore processor indicated that it had succeeded in making an aluminum ingot that filled the experiment's chamber. There was no provision for ejecting the ingot out onto the lunar landscape to be lost; so someone had to go find the thing and retrieve the aluminum sample. But going outside the station, it was found that the machine had gone out of sight, too far to walk in a reasonable time.

So they decided to also restore the old lunar rover that was part of the nearby Apollo lander site, which had been selected for cannibalization, while resolving to preserve the others. They had a small machine shop

and mechanical assembly area; but only had minimum spare materials stock with which to build. Much of the old lunar rover was already designed and built to do just what was need now; so they installed their new battery, re-lubricated its bearings, unfroze some of its moving surfaces, and away it went. Two of the crew rode it to follow the tracks of the wandering aluminum ore processor, which had succeeded in finding the best ore source in the vicinity, at least for one of the two kinds of processors that was on board the machine. They removed the aluminum ingot, and drove the rover back to StationBase1, where they soon sent its chemical assay results back to Earth. It was a go for a pilot plant to produce aluminum on the Moon, to be delivered in the next supply mission to them.

And then they took the ingot to the machine shop, and made a fitting out of it. The filings and scrap pieces were taken out into the lunar vacuum and melted back into a smaller lump by focused reflective sunlight.

More good news: the next supply ship would also have the prototype mass-spectrometer total recycling plant. It would be debugged here on the Moon, an easier place to tinker with it, than in GEO where there was no place to stand solidly while adjusting connectors. And it would be left here, for their use. Although it would only operate during the lunar day here, a lot could be done then, including experiments in total recycling of the lunar soil directly, and they intended some experimenting of total recycling of the sludge that typically collected in the digestion vats.

The Total Recycler took everything apart and saved its raw elements separated individually in buckets. A companion processor for their use, also using the abundant vast hard vacuum on the lunar surface, was for the opposite purpose: take those purified elements

and assemble them by scanning beams, building up a shape and chemical molecular composition directly from scratch. It would be slow; yet if it worked, it could be nanominiaturized to operated at teraHz assembly speeds, approaching the rate at which living systems built molecules from DNA. But this machine would build devices native to the harsh lunar environment. And there were enormous things needing built here to provide the structural sections for the huge Stanford Torus shells, built ready for robotic assembly when delivered to GEO.

It looked like a formidable task, to be building those cities in GEO eventually at a rate enough for a million people a day, a hundred cities a day, when going at full swing, and sustain that for two decades. Yet, the beginnings of those processes were shaping up here already.

Chapter 16 Dreams of an Ark and chess

Idealiana knew of several other surviving species of mammals that had a small reproducing population somewhere, including wild burros in the American Southwest. It would be years until there were enough cities in GEO to spare some room in them for large animals, so she set a goal to get a couple breeding pairs captured and delivered here to StationBase1, when facilities were available. All animals on earth were long considered "endangered", and the few in the wild had to also cope with deterioration of their environment. She hoped to get some of the remaining scavengers, too, such as crows.

It was expected that people would move into the GEO habitat ring cities as fast as they could be built, primarily because they would then no longer be dependent on the digestion tank derived food supply, but actually have clean agricultural farm grown food much of the time, each 10,000-person city having half its area devoted to agriculture, much as had been envisioned way back in the 1976 design for the archetype inner-rotating, passively shielded Stanford Torus space settlement design, originally intended for construction in the Earth-Moon L-5, as far as the Moon from Earth. However, many of the species were extinct now, that had been selected for space-suitable agriculture in that environment. Some might be re-constitute-able from DNA samples saved by altruistic scientists back then and still kept secure; but the means for doing that had not yet been fully developed. The space city people might have to eat burrow meat instead of beef, for example; all cattle had been devoured in the Great World Famine that occurred after

the ecosystem collapse and before the development of the Digestion Vat technology that now recycled their foodstuffs... and anything else organic, including cadavers.

In the space cities, with agriculture, instead of mandatory exiting to the Digestion Vats at an age and work status that was based on the level of survival of the moment, their life span was expected to return to a natural life span; and so another reason that people would clamor to get to live in the GEO space cities as fast as they could be built. And thus it would be difficult to get GEO habitat space assigned for animals' roam-freely habitats. Nonetheless, she was devoting her free time to increasing the possibility that would happen, and successfully.

Her wildest dream was of a 2-mile diameter rotating torus structure containing a salt-water sea environment of the kind which had existed up to 40 years ago, and that would have a balance of sea critters, including some whales grown from DNA saved during the slaughter of them long ago. Imagine, whales spouting as they surfaced, in the 200 meter wide wheel. And dolphins leaping over the surface, learning to compensate for the coriolis force, perhaps, just for the fun of it. She dozed off in the pet farm, one of the animals cuddled in her arms, and her "painted" parakeet roosting on her shoulder, ever half awake through the night.

People-control-power and wealth often go in lockstep. An understanding of that drove a certain kind of people to create Tarfl type corporations, and they all played the same game on the same side of the game board. The money was there for getting a piece of the action, anywhere. Including 3Musketeers desperate projects, like their space carousel escalator project and its

applications, including building things in GEO and on the Moon. All were now ongoing. But the Tarfl motto, "There Ain't No Free Lunch" always applied; and in the ongoing scenario it meant that Tarfl controlled the security in the facilities in GEO.

The station personnel at SpaceDock1 were deeply asleep, while Rationallo and his crew of security personnel approached the control station used by Artesiana for monitoring work progress. Rationallo spearheaded Tarfl's demand to know all that can be known about the doings of others, key data needed to ensure power over all that happens.

Open the door, Rationallo demanded of the security officer, at the door to the Holopresence nook. The door was opened, and Rationallo went in, stood examining the nook. It had been on his mind often since that casual wine tasting event, and though he feigned belief that it was all an effect of the wine, he knew something here was unique, and it connected powerfully with what was going on far away. It was something he had to have for himself. First he had to make sure he could use it, calibrate it, do something with it. Then when one was built for him, it had better work the same way or people would be going very early to the digestion vats. Fresh people would replace them. Until he had one of these things that worked. Power was cold and ruthless, not cruel, merely adamant and absolutely insisted on its desires being filled perfectly, and immediately.

He also was expert with information gathering equipment. He thought back to when this nook was operating, what his experience was like, despite being plied with wine by Artesiana before exploring her little toy. Good wine, he had said to her, quite aware of her effort to hide whatever this thing is, but playing along with her game, on the surface. Back then, he had

mentally recorded everything she did to activate and use this thing. He sat down in its chair, and repeated all those things. And the nook came to life.

Rationallo almost wished he had a bit of wine to celebrate this triumph, here and now, as he quickly repeated the original activities. He was aware of this booth as if he were part of its wholeness. And as in the previous experience, there were lines of connections to things beyond; he had ever so quickly explored one at random, that previous test. He did the same one again, and got the same impression. It had intrigued him then, and it was paying off with more detailed awareness right now. For he was in a structure of odd construction; it had to be on the Moon. It was dim light there, apparently same sleep cycle timing as the one here at SpaceDock1, makes sense to do that. Fine, a perfect time to snoop around there at the lunar StationBase1, no one would notice.

He had been denied access to this facility due to some fancy footwork by the 3Musketeers people before. He was not so fooled so to not realize that was happening. He played his cards coolly, it was what he had been bred, born and educated to do most excellently. In Tarfil corporation, all knew of the terrifying perishing of those who had trifled with him, and none dare do it any more. The 3Musketeers people were about to taste of that terror too. He was not cruel, just quite efficient in controlling people. He flexed his powerful muscles a bit, yes, the latest workout had gotten him in prime physical shape, too.

He found the lines that went elsewhere in the station. There were four people there, he knew. He followed the lines to the station commander, asleep. He had also piloted the lander that had denied Rationallo that trip. The station commander would be the first to be publicly

tortured and executed, as an example, he decided. He then chased down two other crewmen, also asleep in their quarters. Where was the fourth person? No line went to a fourth person. A mystery here, and he loved mysteries.

He checked line after line to each of the facilities, merging his awareness with each until he felt he understood it completely. Yet no fourth person. He then checked in on the animal farm reported to be there, most obnoxious to him, animals with their filth. But that line went to an odd sensation. It was a bird! and the bird was half asleep, the other side of the brain awake, looking out at the room's doorway. Squawk! the bird went, and fluttered vigorously, and its perch seemed to stir and move. It was sitting on a person. The person was waking up as Rationallo willed a connection to that person, hungrily hunting down the details of this mystery. The two minds met in Holopresence space, and knew each other: Rationallo, meet your dead former breeder wife Idealiana, now very much alive.

Rationallo paused long enough to tell the security officer standing outside the nook to have that doctor arrested immediately, the one that had given the false autopsy report on Idealiana. The doctor would be an example at breakfast time for the 3Musketeers staff in the morning; it would be a breakfast that none of the 3Musketeers corporate staff would forget for the rest of their lives. An efficient, effective technique, Rationallo knew, because he had experienced it in his somewhat wayward youth, and it had snapped him into instant obedience to Tarfl from then on.

Idealiana had awakened quickly, and tuned in on Rationallo's Holopresence invasion, and his coldly ruthless command about her friend, the doctor that had saved her life back when Rationallo had activated the

stroke microbomb he had planted in her brain. She ran to her Holopresence nook, and sent instructions to 3Musketeer personnel. Although she had not imagined that total power could corrupt a human mind so much as that of Rationallo's was now displaying, she was learning fast. He was such a clear-headed rational, analytical, efficient man. But now he seemed beserk with wrath, yet without emotion. What had been bred into those Tarfl people, anyway? And it was involved with Tarfl's incredible teamwork, unquestioned actions, like the limbs of a gigantic robotic octopus, multiple eyes and tentacles into everything all the time, ever commanded by a pre-programmed brain.

Tarfl was not exactly her kind of people, she decided. And thus needed a bit different treatment. If Tarfl and especially Rationallo was playing the game of chess with real people, she knew how to play chess as a youth, and had only stopped when she realized that there was no way to win at chess without causing unhappiness in whoever played the other side of the board, and she empathised too much to want to have her friend unhappy if she won ... she had deliberately lost a few games but that did not feel good either; so she had stopped playing the game. And she knew that the widespread boys' sport of football was similarly merely a conditioning mechanism for preparing them to do real battle on some forsaken land with real guns to destroy real people, to "win." So Rationallo and his ilk had shifted chess to real people, so probably he would next do football kind of antics. And she knew mankind needed the space resources to be created and used wisely for all mankind. Making it mere gamepieces with ego-driven purposes might be excitement for adolescent boys in adult mens bodies doing bestial ego things, was not something a wise woman would tolerate in her kinfolk humanity.

Rationallo stepped out of the Holopresence nook, and gave the command that this area be immediately owned by Tarfl Political Corporation from now on. Artesiana was to be prevented from accessing it. He returned to his quarters here in SpaceDock1, to rest up before watching the upcoming breakfast on TV.

A Tarfl's Leroy Brown Society special police team silently arrived at the home of the 3Musketees corporate doctor and his family, the house dark, all would be sleeping. It would stay dark, and the neighbors eventually would wonder why they never saw the occupants again. With the best commando raid skill, the team was in the house in moments, shutting the door behind them silently. By the time they found the disheveled empty beds, they were falling asleep from anesthesia gas which filled the house, the doctor and terrified wife and children huddled in the basement until they heard the thuds of a surprising number of bodies fall unconscious and collapse. The Digestion Vat truck arrived about then; the limp forms of the security assault team went peacefully to the vats, without trace.

But the combat vehicles were another problem, with their continuous link to command central, cameras watching everything, for one thing. The vehicles were ready to receive the assault team with their captives, and take them to where the corporate breakfast was to be held. It seemed to be taking a long time, but all was dark and silent in the house, so it must be proceeding normally.

Then carbon soot bags burst over the vehicles, blinding the cameras and shorting out the antennae. Their power was quickly cut; and before dawn, they were also being recycled in the way of dysfunctional vehicles in the junk yard.

Rationallo awoke the next morning, had breakfast early, as he really did not have stomach for what was to happen; he remembered what had happened to his adventure buddy long ago, another breakfast. He really did not like what was to happen, yet it was Prime Directive grist for the Leroy Brown Society's secret enforcement arm of Tarfl. He connected his TV monitor to join in the breakfast remotely.

He thus watched a rather boring normal breakfast going on, and then the corporate staff all dispersed to their workstations, business as usual.

Rationallo then sat back a long time, thoughtfully. Clearly, it was now his move in the game, and he would win this game as he always won them. This was getting fun, he thought.

Apparently someone in his immediate command had disobeyed him, and disobedience was the ultimate wrong in Tarfl society. He had all his staff who had been involved in the command to dispose of the doctor, and who had been about to take over Artesiana's Holopresence device, gather together. And Rationallo eliminated them. There would be not the slightest hint of any incorrect move by Rationallo in the minds of his people.

Chapter 17 What is it about predators

Artesiana arrived at her Holopresence nook the next morning to begin her day's work, to find that a request had been made, to build a copy of it over in the Tarfl headquarters part of SpaceDock1. She wondered, why would they want one? Surely they thought it was just a recreation device for fantasy escape. They would not know how to use it, anyway.

Tarfl was boss here, however, and not to be ignored; she called the construction foreman and told him to build the external visible parts of a Holopresence nook over where Tarfl had requested it be built.

Soon she was contacted by Idealiana, who related her experience in the early morning a few hours before. That Artesiana was at her Holopresence station meant that things indeed had backed off, scaled back discretely; so they too would resume as if nothing had happened.

Construction would continue smoothly as before; there were cities to be built, total recycling plants to be built, and human civilization was acting human again after a brief nightmare of ego-inspired stumbling.

Idealiana began a new project, one she had not wanted to do: she needed to figure out how to cope with the secret terrorism that was foundation behind Tarfl's rule, and, she guessed, behind the modus operandi of all bullying, the urge to create extreme fear in others to get them to comply with the bully's group-enforced demands ... it had been reproductively very successful for eons, and seemed now to be getting more powerful. She thought sadly about her own daughter Donna Bulgarde, fathered by Rationallo and now being

raised in the Tarfl tradition. What would become of her dear daughter? That part seemed even more hopeless.

For now, she had to learn to comprehend the force behind the urge to forcibly control others; it had something to do with "ego," probably. And likely a genetic component, too. Or maybe a pathogenic parasite that got physically exposed to family members down through the generations? It had something to do with an urge to be "superior" to others, instead of being highly competent in tasks, and being respected for their competent work. Somehow, that "competency" gets twisted into the ability to coerce others, usually by some set of group rules. Bullies in school were not pariahs, but normally were highly esteemed by their peers for their demonstrated ability to terrorize others, particularly to scare the socially inept brainy students, and gathered companions to be led by the bully, forming hierarchies of "status." In most of the bullies, it became tamed by the educational process and corporate structure position risings, became the normal way of doing things.

Yet, it was still the same fundamental thing behind it all, the beast within some people, usually dominant males, and was a mammalian trait very much exhibited in mammalian herd beasts. Perhaps in the study of those herds, she might learn the key to the problems gaining power even now, when mankind was finally expanding civilization into space in a big way, able then to allow Mother Earth to recover from birthing such a wayward progeny that had nearly killed life on the planet. It had something to do with arranging to put the opponent(s) brains into the fear mode, fight-or-flight reflexes at the ready, sometimes called "life in the trenches" from the archetypal mode of living in trenches along battle lines in W.W.I. Trenches were not a safe place from which to get up and look around at the larger picture, thus such

people are easily controlled by others' interpretations of what goes on up there beyond the safety of the trench.

Some had written that the advancement of civilization was solely caused by the technological development of weapons to be used in the assaults, and of who conquered who thereby. The technology then was visibly there for use in civilian applications. A cycle of converting swords into plowshares into swords again, over and over. Would people just go lazy, do nothing, no technology development unless spurred by need to defend or assault? She paused to think about that ... it seemed likely that would be true for a lot of people she knew, but not of all of them. It also seemed that the "bully" phenomenon correlated to the need to assault & defend.

Deeper into the exploration of the phenomenon, she realized that humans, pansy and open aggressor alike, ate food. And that food was the substance of creatures that had been alive, and had now died to become food; this was true of carrot and chicken alike. Even the chicken depended on eating living stuff. Only vegetation derived life directly from the sun, yet even they often depended on some nutrients from decomposed other formerly living bacteria or animals. Omnivores, carnivores, all were predators upon the system that sustained them. Maybe there was no solution to the problem, if life itself depended on being a successful predator. Maybe Rationallo and his ilk were merely better predators than the others, and she merely a grumbling "loser." She searched for the error in this logic, feeling quite uncomfortable with it.

Was mankind being predator on the Moon by building this StationBase1 and preparing to send lunar materials to be used to build cities in GEO? It had been a lifeless place, and now they had brought life to the

formerly barren landscape. Bringing life to where there had been no life before, appealed to her motherly instincts. That part seemed finally something not predatory: to create life where there had been none before.

And yet there was the basic process of tearing down and building up again out of the dismantled materials, something new then created. Was that not like eating food? The caught mouse becoming cat?

It was now the end of her break time, and time to get back to the task of building and operating the lunar base. It was part of the long term responsibility of restoring the Earth. But she carried with her the unsettling awareness that there were some humans, not too unlike her own self, that would destroy her works, even though her works were to help everybody, even them, to better survive. It did not seem sane, yet more likely it was simply caused by misinformation combined with the bully urge on the loose.

The more she thought about that, the more it seemed to be the cause of most of the problems of the world: misinformation plus the bully-urge on the loose. Bullies used information too, so it boiled down to the bully-urge. It was not being tamed enough by the system of giving them top management slots, law enforcement hunting among others, football game prestige. So how to tame it? It was not testosterone itself, it was the motivation pattern, that was the cause; and thus maybe a key to solving the problem: deal with the motivation pattern behind bullying.

Chapter 18 Why failure at punishment

Back on Earth again, Rationallo methodically searched for what went wrong with the “lesson” he was teaching the 3Musketeers corporate staff. The secret romps of the Leroy Brown Society were hosted by the government, which had learned to live in fear of the society, too. And so there was no record of the activity having taken place. But Rationallo found that there were consistently an average of two security police vehicles not returning each day to their garage; also there were several Tarfl security staff that had not reported to work since then, and had not called in sick. He looked into their records, yes, they were among the most competent and efficiently brutal of the Society, too, and thus likely to have conducted the mission to kidnap the doctor and his family. Yet there was no record of a visit by Tarfl security vehicles to the 3Musketeers corporate headquarters. He set the long range surveillance cameras to watch the doctor’s house, and found that there were no occupants there, nor infrared signatures of anyone there in recent times. So there had been a hit made; yet all had then vanished afterward. But he could find no clues after that.

He indulged in a work break, which was for him a virtual experience game where he was Turl, the head of security over the Earth after it was conquered, in the book “Battlefield Earth.” He had had the book made into a virtual presence game, in which he could enter the story at any point, and experience it almost as if it was real, and then modify it a bit from the original story, experiencing its results almost as if a real world experience. Turl was his ideal, his model of perfection. How would Turl deal with this scenario?

This was a mystery, and he loved mysteries. Perhaps that was the only thing he loved. Surely not his wives, he had no love for them; but efficiently preened around them to excite them sexually, paid for their upkeep, and got them fertilized at calibrated intervals. There were going to be lots more of Rationallo genes in the next generation. It was a mark of his success that there was no one he loved such that it altered his methodical efficiency in achieving Tarfl goals. No one's life had any meaning for him except to use their self-preservation urge to leverage them to do his demands. Normally there was no problem, as he had spent his lifetime ensuring that all others complied, any who had even been slow in complying had suffered "accidental" extreme lethal hardship in public view, and so all had learned that there was no choice but to immediately obey Rationallo. As far as he could tell, no one in Tarfl could even think of disobeying him anymore. Yet, here was this mystery. He smiled to himself, this was the first interesting thing that had happened to him in years.

It logically was caused by that Idealiana wench, but she had been on the Moon at the time. There surely was connection with Artesiana, yet she was on SpaceDock1 at the time. There had been no monitored communications from either of those locations back to Earth surface 3Musketeer corporate headquarters. So the communications channel and the physical means to carry out the physical part, would all be powerful new tools for him when he ferreted them out and made them his own. He flexed his biceps muscles looking into the office mirror, were they not quite perfect for posing for clothing ads? That posing was a requirement for Tarfl superior people, they must be perfect physically and pose for clothing ads to be admired by millions of people thereby, and subtly getting into their brains thereby, especially the ones that bought those particular clothes he had modeled for the ads. That

was part of his power. He headed off to the corporate gym to get those muscles tweaked back to perfection shape.

In the gym, he first lay down in a device that grasped his hands and feet, applied neurostimulation pulses to quiver his muscles, and the machine manipulated his body through all ranges of motion, while mentally he dozed off. It then aroused him after his physique was exercised to the desired degree. He then went to the next part of the gym, where he engaged in a ritual martial arts dance of violent conflict with others. Those others were robotic computer controlled mannequins, that did not mind when he kicked their head off to send it flying against the wall, or tore someone's arm off and bashed the mannequin with it. This was all both physical and psychological tune-up for him. All the pieces of those mannequins would later be put back together again good as new for the next round of gym use. It was all coldly efficient, almost boring, yet it provided the vigor that Rationallo needed for a tune-up, relaxation from the ongoing office duties.

Back in his office, he felt refreshed, and looked at the roster of job duties for him. Add up the profits made by each of the Tarfl corporations, and initiate publication of that sum. He got it done in 15 minutes, a good day's work. Then he tuned in to various security monitors surveying his immediate staff. One secretary was showing signs of deteriorating efficiency; not much, but apparent as compared to her baseline performance record. Her heart rate was consistently up, and distraction was showing in her responses to the activities assigned to her. He popped into her terminal monitor, interrupting her work briefly. How were things with her, he inquired of her slightly surprised image. She said they were fine, no problem. He sent a disciplinary shock to her workstation, and when she

had stopped jumping, he asked her again. This time she was rattled enough to blurt out that her husband had left a couple of nights ago suddenly and had not returned since; it had been a secret mission, and so she could not inquire about it. Rationallo cut the communication link; here was more data on the mystery, yes.

He now knew the identity of one of the operators on that mission. He accessed the man's records, found the code for the location implant in him, and triumphantly activated its location signal.

It was in the sludge of the digestion vat.

Rationallo was thinking that he was finding himself staring thoughtfully too many times lately.

He smiled to himself, It appears that the 3Musketeers bunch were beginning to use tactics like his own. Good. When everybody is playing the same kind of game, it is easier to manage the game. And when he conquered them, those 3Musketeers, at last, they would already be good troops, using the same techniques.

But then, who would the opponent be? There had to be an opponent, or there would be no need for readiness for assault. And that was unthinkable to him. If there were no foe, how would he rally the people together under him to assault the foe?

The usual chat with his buddy Guardiano was a time to discuss these heavy things outloud. They both had noted that there were a few faces missing from the platform at the weekly Leroy Brown Society meeting. If it was a beginning trend, it had to be stopped immediately.

But when Guardiano heard about Rationallo's command to kidnap the 3Musketeers doctor and his family to use as examples to terrorize the 3Musketeers corporate staff at their breakfast, he reacted strongly. We need that space carousel escalator of theirs up and running full capacity to get the masses of people to abandon their property on earth's surface, before the takeover plan can be fully implemented. If the assault on the 3Musketeers corporate staff's psychology had been completed, it would be a major setback for Tarfi's long range goals. Better now to be glad it failed and to bury the whole problem, Guardiano advised.

Chapter 19 It's about bullies and winners

Idealiana was still busy at idealizing for solutions to the overall problem. As she saw it, the human-bulls were horsing around and wreaking havoc all over the place to claim territory and harems, while people really needed to be putting the majority of intelligent cooperative effort into establishing the expansion of civilization into earth stationary orbit cities needing to be built.

She wryly imagined that even the process of seeking ideals in solutions to ongoing problems was a waste of time in the opinion of those people who were physical action oriented; their solution tended to be to solve a problem by going in and beating up on the bad guys to straighten them out, get them back in line in their place, to restore law and order; end of subject, to them. Yet she believed that any solution that did not have a reasonable path all the way to the solution of distant needs, was mere spinning of one's wheels, or going on wrong detours. Those whose instincts were to assault others to gain compliance, tended to pass on abuse from generation to generation, ever howling about the wrongness of abuse. It was the "bully" motivation thing, perhaps the entire problem. It appeared to be a mode also more wired into the brains of some people, or at least a lot more so in some people than others. She had little or no urge to assault anybody to solve problems; although she remembered that if she got totally frazzled and overwhelmed by things far too long, she could get weakened enough to resort to flailing around in the physical world so as to try to right things a bit, or at least to hang on.

So she could understand that mode a little bit; what was more difficult as to why some people seemed

stuck in that mode and were powerful enough to not have to stop it. Like the Leroy Brown Society machos, such as Rationallo and his buddy Guardiano: behemoths run amok in slow motion berserk, almost unstoppable, and being super rewarded by humanity's resources and provided many progeny as reward, also.

The level of lethality considered acceptable varied according to the level of conflict that was declared for the activity, increasing as the conflict scaled up: from game, to sport, to competition, to rivalry, to war. Somehow tacking the level's name onto something shifted the minds of the assaultiveness-doers into different gears; "war" seemed to give permission to do most anything they wanted, even kill, so long as it could be made to look as if done toward the accomplishment of winning that so-called war.

Yet it was not caused by testosterone hormonal excesses; it surely was needed by brave souls who had to deal with the dynamics of creating the space transportation system and huge facilities in GEO, took lots of guts and go-do-it testosterone energy, to get the jobs done and sometimes even survive heroically. No, the problem wasn't the male energy, it was a particular warped use of that energy, one that was highly reproductively successful and thus perpetuated itself, despite being a parasite on everything else. Among humans, it rationalized its assaultiveness by declaring itself a "winner."

So, how to keep directing the motivations of assertive energy toward that which helped everybody, since the survival of the individual depended on the survival of the support base provided by all those other people?

Composing a working solution would only be identified by its success. It was something like the old saying that

if one had enough monkeys typing on keyboards, that eventually one of them would have created one of Shakespeare's Sonnets exactly. Yet she wondered how many more monkeys it would take to read all those typed pages to identify the one with the Shakespearean writing. Then she went on to ask the related question, of how many monkeys would it take in a former earth jungle to make one of those lunar rovers out there, complete with charged battery. She suspected it would never happen, unless the monkeys got changed their natures and physiology, and they accumulated knowledge and technology. Then what would select those changes in those monkeys so as to enable them to make a lunar rover, God?

If God is defined as the maker of all things in the universe, and the universe made of God's own stuff ... maybe so. So why the making of bullies to romp through civilization's china shop? It seemed reasonable that it would be a self-correcting system, based on feedback, reality testing. She needed a direction to go, a plan that went more in the direction that would help create the wholesome expansion of civilization.

Maybe it would help to redefine "winner." Something separate from being a winner by making someone else a loser, for example. She needed to create some vision in which some quick plan could be prepared when the next bullying romp raged through her world.

It was time to stop philosophizing and get back to work, so she set her computer terminal aside, and went out to get into her lunar ground suit. It would be nice to get technology up and running at the level that they could have shirtsleeve-interior vehicles equipped with robotic arms, in which to ride around out there to get things built. For now, all they had were the space suits, and their own muscles to move around on the ground.

Stepping out of the airlock, for an instant she thought it would be nice to have a planter with some flowers right there on the porch, then realized the airless reality of the porch and for far beyond it as far as she could see, except for a few structures they had built themselves. Maybe they could import some gophers from earth, to teach them how to live this way.

250,000 miles away, on the Earth's surface, in his office, Rationallo was also busy thinking. He had three of the remaining working devices that were used for remote behavior modification and interrogation, built long ago. Although they were first invented and were to be used to help a concurring person overcome some bad habit, its usefulness for harassing an unsuspecting opponent without fear of reprisal had soon taken over the technology. Some units were used for supplying specific request action to investigative agencies, to keep in their good graces, of course. Pity that the technology for making them had vanished, back there in the Great World Famine era. Just who had one of these Radionics things was not always known, because it was a powerful tool for messing with someone else, thus quite useful in the struggle for power.

These devices had been quite useful in his rise to power. As much of technology, he did not have to understand how it works, only needed to know how to get it to do what he wanted it to do. It was a mysterious thing, however, and at times in the past he had researched its background, where he found indication others had gone that path before him, and had made the path difficult for others, it was a treasured technology.

It worked a lot better on some people than others. The intuitive types like Idealiana were most susceptible to it.

He had not kept DNA samples such as bits of fingernails or hair while she was caged in one of his HaremSpace units, unfortunately. Nor did he have a good photo of her recently; but he did have her photos and other identification data from the latest census database, and the description of a small DNA segment required to identify each person. From these he made his "witness" for the weird Radionics machine.

It was computer operated, an advance over the ones his more distant fore bearers had used. It appealed to the instincts of the hunter to abuse and harass the quarry by doing it oneself; but he did not have the time or the patience to do it himself anymore, so he entrusted the computer to do the dirty work for him. From a standard set of subprograms, he programmed short phrases in that he guessed would have shock value to Idealiana; the machine would send the phrases at random intervals into the subliminal receptivity of the quarry, and get a bounced feedback indicating the strength of its impact on the deep beliefs of the person: did the person's tone become stronger or weaker or no effect; and the computer recorded the results. At the very least, the random interval unblockable messages appearing seemingly impossibly out of nowhere, triggered the RAS startle response, which then had to be calmed down by the rational mind deciding there was no real problem; the interruption of the previous trend of thoughts itself dragging the efficiency of the person down, over time. The computer would work away at the person's subliminal consciousness on and on; and occasionally Rationallo would go over to see the results harvested by the gadget. If the general tone of the person was getting consistently weaker, he had picked a good set of phrases, and from them he could focus on more like them, the ones that shocked the subconscious the worst. He set the machine to go on its first run with

Idealiana as the quarry, the target; then he secured this area and went to his regular office area.

Although his workday actual work took only about 15 minutes each day to add up the aggregate corporate subsidiaries' profits and post the result, the job required ongoing training for all employees, himself included. The general pattern was a sequence of 20 minutes higher education, followed by 15 minutes of personal combat exercise like kick boxing, fencing, or karate. Then 10 minutes of public appearance grooming; then 15 minutes of public speaking about Tarfl operating principles. Then the cycle would start over again, repeating for the full 6 hour workday. It made for a rigorous work style and kept everybody in aggressive shape, physically and mentally. Once a month they had to run a 50 mile marathon, climb a simulated mountain structure, and play Jai Lai. The exercises were dangerous enough that when someone started "losing it", it showed up in the dangerous activities and so the person was likely to go directly to the digestion vats; thus everyone on the job was in tip top shape all the time.

Tarfl people were the elite and intended to remain that way; and the wealth they enjoyed made it all worthwhile. Many fine parks and art displays were distributed around their part of the city, which occupied three quarters of the city's area, and housed 5 percent of the city's people. They lived scornfully superior to those of the other one quarter of the city, the 3Musketeers sector, which housed the other 95 percent of the city's population.

Life in the 3Musketeers sector was quite different. Half of the people were employed in menial jobs over in the Tarfl part of the city; the other half were employed in facilities owned by 3Musketeers themselves. Their

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workday tended to be 12 hours, often doing the same thing all day. They too had daily on the job training, to learn other tasks which they might need to do at times. The workday started with a company breakfast followed by 20 minutes of Yoga exercises; and they had an hour of aerobics exercise each midday.

Chapter 20 Management of the game

It was Guardiano's turn to be talkative after the next weekly meeting of the Leroy Brown Society. "I tell you," he said, "that there is something wrong going on. Two meetings several of the lead members have been missing from the meeting, and he had heard comments in the crowd about several other strong members who have not been at the meetings either. One meeting, maybe they are out on a secret operation, even though normally a point was made to not do them when it would overlap the weekly meeting, which was a time of importance for those whose special daring and power were making sure that the forces of waywardism were held at bay."

"Also," Guardiano continued, "there is an uneasiness generally among the members there. Something is going on, what is it? It is essential to follow the traditional rituals, otherwise chaos will begin to encroach. We are the finest of humanity, and set the example for all others to follow, maintaining order and well being for all."

Rationallo was only half listening; he had heard it all before, over and over again. Besides, he knew what the problem was, at least about the people not showing up at the weekly meetings. Although those missing were among the most impressive of them all, and that did worry him a bit. He knew it had been those 3Musketters who had somehow disposed of the group's commando team; and apparently it had been an operation conducted by the finest. That was impressive. And how to prevent it from happening again was his interest. And he could not tell his friend any of it, such as was the society's rules of secrecy.

Surely secrecy had been maintained for the operation, standard procedures. Perhaps a bit too hasty, due to the irritation probably evident in Rationallo's voice when he gave the command to do it. Maybe that was part of it, the team was moving too fast, and too suddenly. In the past, they had done similar operations without a problem, many times, however. And the command link he had used to define the mission to kidnap the doctor and family and make them horrifying examples to bring the 3Musketeers staff more in compliance with Tarfl's leadership.

Guardiano broke into his thoughts. It is the 3Musketeers wayward ways, he proclaimed, that was defying traditions of all kinds. That was the problem, it was rot at the core, and needed to be removed.

Yes, Rationallo agreed, both Tarfl and 3Musketeers corporations need to play by the same rules, or they are not playing the same game, and that does not make sense, to not play the same game.

But then he mused to himself, that despite lack of rigid chains of command, the 3Musketeer people somehow still managed to achieve incredible things. He was quite content to aspire only to sell more sporty clothing at his chain of department stores, year after year, the best of the best. But meanwhile the 3Musketeers, had fumbled their way to be creating a huge space transportation structure and power plants in GEO, more and more. They had needed the money and engineering talent to really make it happen, and so Tarfl had gotten in on the action, and of course had to direct it all, if it was their money on the line.

And despite it all, the 3Musketeers people got the cooperation of their people without the hidden terrorism equivalent of Tarfl's Leroy Brown Society. Now that

was impressive. How did they do it? How do they enforce compliance among their employees, their underlings?

Well, it was clear that it was the lack of solid discipline that made much of the difference between the wealth and power of Tarfl people, as compared to the multitudes of struggling 3Musketeers people. And since Tarfl money and engineering expertise that were being invested into the 3Musketeers space carousel escalator applications project, correct discipline had to be maintained. It was clear that a severe breach of discipline had been made, and 3Musketeers would have to be adequately disciplined correctively. But, wasn't that what was ongoing when the current loss happened? The perfect disciplinary terrorization by use of the sacrifice of the offending doctor, and his loved ones, at a time when they would have the attention of the 3Musketeers corporate staff, had not yet been achieved; and the Leroy Brown society had suffered severe loss of some of its highest members in the activity. It would take an adequate disciplinary action to set this all right, indeed.

The tradition of burglarizing the membership files of the opponent party was long a key part of Tarfl's predecessors traditions. Establishing a record of who voted against them, and maintaining that record available to all of one's own corporations, enabled them to reject employment to those nonmembers; or if already employed, to have them no longer get raises like their coworkers were getting; it was a most effective technique, never mentioned but increasingly clear to people which side they needed to be on to succeed in life. Tarfl Political Corporation had always maintained their records of themselves, and to a less detailed extent the 3Musketeers Political Corporation's people's records. Birth and death records had

maintained that flow; people were born into one party or the other since then. Now Tarfl needed more detailed data about the intimate daily lives of all 3Musketeer people, so in the finest tradition, it was time to stage a burglary on 3Musketeers own personnel files. And in the process, they likely would stumble into info about the whereabouts of the offending doctor. Things would be set right again, once adequate knowledge was acquired.

Chapter 21 Discipline versus new life

Eventually Rationallo realized that Idealiana was clearly alive and even far away at the new lunar StationBase1, and that many people knew that; yet also she was keeping silent about her life disruptions caused by him. So for now she was a difficult target, and not as essential to immediately eliminate as he had thought. Her doctor, too, knew too much; yet was also keeping a silent low profile. Well, if he could continue to keep them heads down in the trenches, for now he could deal with other things, backing off on the disciplinary actions toward them.

In fact, his chat with Guardiano last night had again brought up the point that the sooner the 3Musketees got the GEO Habitat Ring civilization built and populated, the sooner Tarfl could initiate its great plan for easily owning the whole world. That meant that any disruptions Tarfl made, even disciplinary ones perhaps, would slow the project for merging civilization into Earth orbit constructed resources. When Tarfl suddenly took over the whole Earth with all its resources, that would be final disciplinary action. So, don't rock the boat, for now, despite the sense he had, that he was being challenged by Idealiana and her doctor; retribution would come later, in due time.

It was not his way to leave things to chance. The tradition was to eliminate any witness "accidentally" along with a lot of bystanders, so it can't be determined in court that the one person was the actual target of a designed accident. In this case, it would work out beautifully: A Tarfl patrol cruiser would be quickly assembled at SpaceDock1 and on its maiden voyage, a few months from now, it would launch a missile

aimed at a vulnerable section of lunar StationBase1, making it look, to the wandering news TV cameras outside the facility, like a big hole from a meteor hitting it, pity it happened during a sleep cycle and all air was instantly lost from the entire facility, nothing survives alive. The Tarfl spacecraft, manned by Leroy Brown Society operators, would heroically speed to the lunar base, only to find everyone there expired. Examination of the facility will show incompetent management and Tarfl takes facility over to get it running correctly; and any trace of information by Idealiana will be methodically destroyed, of course. Problem solved, and big wins besides.

It was great to be such a manager of events. He flexed his biceps, checked his trim in the mirror; it was time to strut down to his office to excite all his secretaries, their admiration of him was part of his successful energy, and had to be cultivated. He would also change to a new shirt style, to set a trend to sell more shirts in his stores, good business all the way around.

Meanwhile, at lunar StationBase1, idealiana had finished her chore of feeding the pet farm's inhabitants. The mice had succeeded in having babies, the first creatures born on the Moon, raising their population by four. She had learned that one kind of her pet couples here had become the last surviving members of its species; it would take a lot of effort to bring back the species from the few here, but at least they had a chance of avoiding extinction, and maybe go on to populate areas of the GEO Habitat Ring, and when earthsurface environment was jump-started back to a long term viable system, their progeny would again walk the earth.

Relaxing in her quarters, she examined some of the belongings left behind by the crew member who had so

generously swapped places with Idealiana to enable her escape from Rationallo's surprise inspection visit. That crew woman had been a graduate of Carousel Tech, a small college set up by 3Musketeers to educate people who would become as familiar as possible with the space carousel escalator when it was being built and then operated, then used for construction of the applications in GEO and here on the Moon. One of the textbooks was titled "Relativity in Human Reality", and had some basic principles, like "every individual human's reality is unique" and "since a human's presence intercepts the sensory data stimulating ongoing experience, no other person can exactly experience any other person's reality". They resembled the physical laws that declared that no two objects can occupy the same space at the same time, and that the act of observing something always alters the observed, making the thing not truly knowable.

She set up the bioscanner to herself, and found that a few *Ascaris* parasites had taken up residence in her body, no doubt received from somewhere in the pet farm. She relaxed back in her chair, connected the electrodes to her wrists, and set it to send a 10 volt peak pulse train of 408 kHz into herself for several minutes to resonance-disrupt the *Ascaris* parasites wherever the signal could reach, then switched to the EBV frequencies of 380 and 375 kHz, as she carried it permanently as did most people, and could only get at the virus that was moving around in the body fluids at the moment. Then she set the instrument to 4.9 Hz awhile to prepare herself for good sleep. The efficient electrohealing technology was perfectly suited for out here where no significant medical facility could be built and staffed for many years, and so the crew was expected to monitor and care for their own well-being as a routine thing. She intended to bring some herbs in to grow here; but other than a few air-cleaning plants

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inside the facility, grown by artificial lighting, they did not yet have proven facilities to grow plants on a large scale.

Chapter 22 Air in a closed environment

Idealiana was finding problems with the external greenhouse where the experimental patch of Quinoa was being grown. The atmospheric composition in the tiny greenhouse, separate from other structures they had built there on the airless lunar landscape, was difficult to maintain. Although the station had plenty of oxygen from chemical processing on lunar materials, they did not have a source of nitrogen to make up for losses in the leaky greenhouse. And to provide the carbon dioxide the plants required, the crew took turns relaxing in the greenhouse, their exhaled CO₂ being the source. The next greenhouse was going to have to be part of the main inhabited station, they decided, to get CO₂ from the crew directly.

They were also having trouble with nitrogen air losses at the main station, and hydrogen supplies for water noticeably getting lower. They had started with a huge supply brought in on the original landing from GEO SpaceDock1, but it was clear that they were far from a fully self sustaining facility. The cities to be built in GEO would have even worse problems, as all materials would have to be imported and exported. At least they would have solar power continually, unlike here on the Moon where two week long nights had to be endured.

Chapter 23 Is looking like home is the target

At SpaceDock1 in GEO, Artesiana was making her personal inspection and tour of all the facilities there, continuing to get to know all the crews and jobs being done there under the more specific direction of specialists. She found that a new port launch work site was being started in the area where Tarfl had its offices, an odd place to put a spacedock, she thought. Her usual cheery walk through of facilities was not seemingly appreciated by the Tarfl people there, this time. She was told it was just a handy dock for the construction and port facilities to service a new Tarfl patrol craft; but couldn't get much of an answer as to why there was a need for a patrol craft up here in GEO. It was clear to her that they were doing the job quite hastily, however. And to her mind, she had found that "haste makes waste", and is especially risky up here in this environment so new to people.

Visiting the Tarfl crew recreation facilities, however, she was impressed by the huge windows facing the Earth. She had the place to herself at the moment, and took time to meditate awhile there. Meditation was not usually her thing, but she had learned it as part of being more balanced in her coping resources. Sitting meditatively cross-legged on some of the cushy pillows provided for the Tarfl RichElite, she contemplated the mostly blue and white sphere out there, hugely filling the window view. Sri Lanka, India, and Indonesia were the closest land areas, the vast expanse of ocean filling in directly below and all around those land masses. It was all peaceful, the hum and distant rumbles of machinery being masked by the playing of ocean surf audio, which actually was coming from the Ecuadorian coast down on the opposite side of the planet, where

the space carousel escalator had its Earthsurface terminal. Gently, Pachelbel music was merged into the surf sounds. Yes, these Tarfl people knew how to make the good life. Yet, they did not seem to be here enjoying it, why?

Suddenly a group of people came in, one was chattering loudly to the others. She listened in, having blended into the room as if belonging there.

“Here is the kind of experience you will be offering your guests, if you build hotel and recreation facilities up here. Sure, it will be a high place to seduce; yet also the view from here is unsurpassed anywhere on the ground. So let’s all take ten minutes to quietly contemplate this experience, deciding if it will bring up your wealthy tourists.”

“Tarfl Light Rail will be building a major in-orbit rail commute system from the carousel port here, and eventually will extend all around the orbit, making access to all areas of GEO easy. First, it will extend in the African continent direction, and is where we suggest both the large hotel corporations build their first hotels for their RichElite guests. And just beyond them, we will need built much more modest, long term occupancy hotel facilities, for the people who want to get a head start living up here while the first cities are being built, which will have condominium size homes for 10,000 people in each city. But it will take awhile as production facilities are ramped up for building the major structure of cities number three and higher, only two cities will be built from materials all brought directly from the ground, since the carousel transportation capacity, though huge and continuously operating cheaply, has many other things it needs to bring up here, beside construction materials for those huge city-wheels. So we expect many people will choose to live

in lower rate hotel facilities for perhaps many months before moving on.”

“Looking in the Indonesian direction, you can see the prototype light rail commute system. Note that it is built off to the side, actually a pair of rail lying along GEObit, 300 meters apart. The first ring of city wheels will need to rotate in the earth’s equatorial plane being giant gyroscopes in a way, and the spacing of the rails sets the limits to their wheel girth along with their non-rotating passive shielding thickness, inside which each wheel-city rotates to provide earth-normal gravitational function inside itself. So the size of your hotels will also need to fit easily within that 300 meter width.”

“This wonderful view we have here of the planet, is not a direct view, remember. It is seen through a huge periscope which has its earthward mirror rotating at the same rate as our station wheel here, and is rolling around a circular track along what appears to be our wall here. Remember, we are in a slowly rotating wheel-station that rotates in the earth’s equatorial plane, too, much as the wheel-cities and your hotels will rotate. You will need to build similar view facilities for your better hotels.”

The saleswoman continued chattering as she led the group on to their next destination, and her voice faded out of the room. Artesiana pondered that the purpose of this facility was perhaps more a sales gimmick than a gift to Tarfl employees for their break time. She had not heard of the synchronously swiveling periscope mechanism before, but it makes sense as she pictured the rotating structures in her mind. She made a note to see what Tarfl would charge to build such a facility for the 3Musketeers recreational center; as it seemed to her to be a psychologically healthy thing, not mere extravagance. She indulged herself another 10 minutes

contemplating the Earth's roundness, wholeness, majestic beauty; although now it was a bit different, realizing she was looking at a reflective surface, instead of looking at the Earth directly. Part of the sphere was shading to dark, as night took over that part of the Earth. She made a note to come back here some day when it would be almost total nighttime down there, to have the sun shine directly into here at the edge of the periscope, past the African continent edge of the world, to fill this room with Earth's atmospheric haze tinted light of sunset.

Returning to her office, she passed again by the area where was to be built and stationed a "patrol" spacecraft. What exactly was that, and what was it for? There were no space aliens from Mars or anywhere that could be found upon a century of straining to find them. So that left only humans to be the quarry of a patrol craft. 3Musketeers only had the lunar-GEO transfer spacecraft and its lunar descender shuttle in its bay. A rather cumbersome huge thing, needing streamlining only insofar as its center of gravity, certainly not a speeder to be given a ticket, or a warcraft. Maybe the Tarfl people just had to have police vehicles that roam wherever they live, as a matter of tradition, to feel in control.

Back at her office, she pulled up the bill of shipping materials being sent to that office area which was also to be a spaceport for a curious vehicle. Separating out the office supplies from the list, she found some things probably to be devoted to the spacedock and spacecraft itself. Yes, among its supplies were a few machine guns, standard Tarfl sector police issue. But more interesting was a police grenade rocket launcher complete with its remote directing laser guidance system; it was one of the types that use lateral thruster jets to steer rather than air vane steering. That irritated

Artesiana, any idiot blowing up a grenade explosive inside her station was a total idiot. But then, one does not need laser remote long range laser guidance to shoot at anything inside the station. Who would they want to be ready to shoot at here, with such a thing? A grenade going off anywhere in GEO facilities would have its shrapnel causing all kinds of havoc, such as the huge photovoltaic panels of the solar power plants, not to mention the habituated facilities or anyone happening to be out in a space suit doing some job. Tanfl facilities and people would get killed, too. It made no sense.

She had better keep an eye on that project. It would have to be done as unobviously as possible. Yet no doubt Tanfl was even now snooping about her snooping regarding the patrol craft. And she was aware that Tanfl had pulled some caper regarding Idealiana, and that had required a quick transfer of Idealiana to their lunar station; but no one was talking about all that. Clearly Tanfl was capable of doing something that 3Musketees would not like. Although a patrol spacecraft in GEO could be built and operated for an insignificant fraction of the worth of Tanfl, it would cost something; and Tanfl spent not a dime extra for anything, no more than they gave anything to someone else without a pay back expected. They did live up to their name, TANFL was the acronym of "There Ain't No Free Lunch" she wryly remembered. They were not crazier than anyone else. Therefore they likely had a specific purpose for that patrol spaceship.

She ran volume calculations for the patrol fuel tanks, compared with its other structural masses, and was amazed at how the thing must need to operate autonomously for years of cruises puttering around in GEO without refueling. Yet the crew supplies were only for a few days mission. So it was intended for a high

delta vee purpose. And the only way to expend that energy was either to drop to somewhere down along the carousel, or to go to the Moon and back.

The Moon. Oh oh. Idealiana was in trouble, she suspected. She went to her Holovision nook, found Idealiana in hers on the Moon, and they conversed about these things. What would happen if a standard issue police rocket grenade hit the lunar station somewhere? "Bad scene", Idealiana answered. Among other problems, it is very hard to breathe when all the air has suddenly gone out a big hole into the surrounding vacuum. Even their precious genetic stock in the pet farm would all die in moments. Who would play so dirty, and why?

Idealiana felt despair that her presence here could be cause of the station's destruction. Tarfl could rebuild an equivalent facility for processing lunar ore for construction uses in GEO, without thought of the cost, they were so wealthy. So even if the missile were to destroy everything, it would be of no matter to Tarfl Political Corporation. There seemed nothing that could be done to fortify the facility, and she could not leave it to be a target elsewhere.

The rocket grenade's impact kinetic energy would be worse than its explosive charge. It could be a rock of equal mass and if it hit a vulnerable place, the station would be holed and airless in seconds. The metal composition and internal grenade explosives would just add to the mess it would cause.

However, most of the inhabited section was dug in for protection from cosmic rays and even the improbable meteor hit. The half-meter thick cast basalt blocks which formed the major part of the buried living and office areas, were welded together with melted lunar

glass. Shock fractures might render it quite leaky, even if not holed directly by the missile. There were vulnerable areas, however, and it seemed likely that was where a guided missile would be directed.

The four of them got together and discussed the situation. They had limited resources for modifying the station. Even if they survived in some small area, a "rescue" landing party armed with police machine guns would not be something they could survive. The genetic preserves of their pet farm were more important to them even than their own lives; but to Tarfl's views, the animals would be merely put quickly into the station's digestion vat. Along with the lunar station crew's bodies. None of it sounded good to them. They had worked so hard to create this first lunar station, and get its ore processing experiments going. Their hopes for being able to repopulate the earth with something that could be a balanced ecosystem again, would be hard hit if their pet farm died. If they sent a warning message to Tarfl, it merely would alert Tarfl that they needed to be more sneaky about the operation, and hush communications up from the lunar base from then on.

The construction of the patrol spacecraft was expected to take about 2 months more, and that was assuming they continued their present rather hasty, but not panicked, rate of activity. For now, it was likely they thought their operation was unexpected by 3Musketees.

They probably could request another supply mission earlier than scheduled, have the 3Musketees' lunar orbital transfer craft return to lunar orbit, so their surface to orbit transfer shuttle could access it. Probably Rationallo would not insist in riding along, since he already knows Idealiana is hiding at the Lunar

StationBase1, with nowhere she could safely go from there. What could they requisition for supplies that would save the situation?

Meanwhile, at GEOSpaceDock1, Artesiana was casually continuing her visits to all facilities. When getting near the offices leading to the patrol spacecraft berth, she found a massive security lock down, and polite suggestions to keep on walking. It was Tarfl policy to protect their investments, she was told. None of her business, it was just Tarfl standard procedure.

Artesiana replied that as the SpaceDock's director, she would find it highly useful to ride along on the initial flight of the patrol spacecraft, to get a firsthand look at all their facilities, it would be a wonderful opportunity to observe progress from the outside of the ever growing complex. Wasn't a patrol spacecraft supposed to be used to observe order and compliance with directives? As the station's director, she declared it was her position to ride along on that journey, and also ride along routinely every month or so. Who did she have to submit her request for this, who was in charge of the patrol spacecraft's missions? Send your request to Rationallo himself, they told her.

That was bad news for Artesiana. She was one of Rationallo's "wives-at-large" per the long-ago agreement, when the 3Musketeers headquarters manufacturing plant was to be rebuilt to make the critical sliding armature segments for the carousel escalator's motor. She was still a wife, legally. And Tarfl wives were very subordinate, most being locked away in Haremspace enclosures. Artesiana's position was very precarious; she did not want to wake up some morning to find herself in a Haremspace enclosure for the rest of her life, making his babies. Legally, Rationallo could make that happen.

Nope, she liked her freedom here in the GEOSpaceDock, much more room for her to roam, for one thing. A ride on that patrol craft was likely to be her last taste of freedom. Was she willing to pay that price for one chance to do something that would just be set aside until a subsequent cruise by the patrol craft?

Even now, Rationallo would be notified that the patrol spacecraft was getting too much attention from 3Musketeers personnel. She needed to back off, way back.

Chapter 24 Dealing with the garbage

The 3Musketeers GEO-lunar orbit transfer vehicle was scheduled to make a supply trip a bit sooner than originally planned, to provide more nitrogen reserves, and provide materials for a greenhouse that was contiguous with the main station and would be used to grow the proven combination of corn, beans, and squash as did the indians so successfully grow long before, keeping the land healthy with the combination. Would it work in space greenhouses, on the Moon, in lunar soil? It would be important to find out quickly. There would also be sent some supplies for preparation for the next station expansion, such as inter-section airlock doors.

Not mentioned was that some of the doors were to be used to secure the various sections of the existing station, such as the pet farm; and that inside some of the doors would be the components for some 3Musketeers weapons: they were going to level the playing field a little bit, where possible.

After the supply ship left, the first place a door went was to isolate the astronomical observatory section, where a hit by the rocket grenade was most likely to happen, as it had the least bulk between it and the surface. Its cameras could be remotely operated, anyway.

And when the patrol ship made its test flight, it was tracked and followed by the lunar telescope, and its field of view linked direct to GEOSpaceDock1 scientists. Scientists who subsequently were quite startled to find the telescope tracking what appeared to be a rocket grenade accidentally lost by the patrol craft,

and sent its tracked picture all the way until the astronomical facility went silent when hit by the grenade. The last picture frame clearly showed the business end of a standard police rocket grenade, along with its serial number. No meteor, that.

At the same time, the lunar StationBase1 went entirely silent. The external wandering robot TV cameras scurried over to the gaping hole in the telescope facility, and then found all power and lights were off even in the Quinoa greenhouse. They must need rescuing, having been hit by a meteor, Tarfl declared, and by great fortune Tarfl had a new spacecraft in orbit that could bravely attempt a rescue mission to the lunar surface.

The rather experimental Tarfl “police” cruiser, flown by hardened Leroy Brown Society members, made a rough landing outside the lunar base, buckling one of its base support struts. They were out of their element, but besides being tough men, they were courageous to some extent, too; and so they sealed their spacesuits, exited their patrol craft, and went to the station’s airlock. Opening the airlock, they entered the entrance warehouse, which they found airless and dark; their flashlights scanned the area and found a spacesuited figure resting in a chair. They shot it to pieces, it fell off the chair. Dead men tell no tales, had long been one of their tried and true principles.

The way into the next part of the station was blocked by a closed bulkhead, that had not been in the station plans given them. Were there more people still alive here? Never mind, they would soon not be. They closed the outer airlock, and pressurized the shipping warehouse room, so they could open the bulkhead door. The next room also was dark, but they noticed that parts of their spacesuits glowed, there were UV grow lights still working in the room. Which clearly

showed their positions in the dark to the sharpshooting base personnel waiting in the room. The invader's machine guns clattered to the floor as the arms that had been holding them at ready, were made useless by the sharpshooters. One gun, two, three of them clattered to the floor. The station internal room lights came on, to show three wounded Tarfl spacesuited figures, who immediately attacked using kick boxing against the station personnel, their arms now useless. The powerful Tarfl men had kick-broken the arms of two of the station personnel before their legs were rendered useless by the remaining sharpshooter.

The station personnel retreated into the next section, and sealed the bulkhead door behind them. Removing the spacesuits of the two whose arms were broken, they called up the medical records of the two, and used the skeleton data to reset the broken arm bones to their original exact positions, and sealed a cast to hold them there, while electrical currents were started to begin the bone healing process. It had taken almost an hour to get this done. Again with weapons raised, they opened the bulkhead door to the room to fend off the attackers. But there were too many holes in the attacker's arms and legs, the fight was gone out of them along with their lifeblood puddling the floor, none remained alive to continue the assault.

Lunar StationBase1 electric power came back on, and sent a message to GEOSpaceDock1, that they had been hit by a meteor but had survived, and that an odd spacecraft had crash-landed nearby too, and that they were adding the dead crew to their digestion vats, and were going to be using scrap from the crashed spacecraft to build a new ore processing facility.

They also reported that the new greenhouse had survived, and the small nuclear electric power

generator brought by the second supply ship was providing light for the squash-corn-beans in the greenhouse during the long lunar night, and were growing nicely. They would have a fine Thanksgiving Day feast coming up, real food for some of them for the first time.

But the reality was that half the lunar station personnel were not fully functional, having both arms in exoskeleton-assisted mode, and would be for several weeks. They had a mess to clean up: three messy Tarfl bodies in their main office area, and Idealiana's spare spacesuit was in the next room, the shipping-receiving warehouse, shot full of machine gun bullet holes; and the packing material with which they had stuffed it so as to have it sitting on a chair, was scattered all over the floor nearby. They shuddered when they thought that it could have been one of them in that shot to pieces condition. Those Tarfl spacemen were tough cookies; they had better remind themselves to be careful next time when inviting Tarfl spacemen over for tea.

The astronomical section was ruined. The automated telescope had been salvaged from an old satellite found in GEO, left over from before the Great Famine; they no longer had all the technology to build one anymore. Eventually they would requisition a standard TV camera robot, and adapt it for an improvised astronomical telescope but it would not be such high quality as before. They brought the shrapnel-ruined electronics from the room out through the gaping hole, and took it back inside to remove whatever parts that could be salvaged. Having learned something about "accidents" from recent events, they also dropped some of the structural debris on the wheels of the Tarfl TV news camera robot, freezing its range of vision to the gaping hole, and the repairs that would be done

later. But for now, was better to not have it go over to look at the less-than-crash-ruined patrol craft, at least until the vehicle had been been disassembled into pieces.

Meanwhile, in GEOSpaceDock1, the scientists who had observed the true nature of the “meteor” that had hit the lunar base telescope they had been using, were told to hush up about what they had recorded about the nature of the missile that hit it. Nevertheless, the scientists were irritated that they had lost one of their best astronomical facilities, and their ongoing projects which required it, were permanently shelved from now on.

There had been no data sent from the Tarfl patrol spacecraft during that “test flight” as they had intended to leave no record of what truly transpired in the “unexpected rescue mission” to the lunar base, and as far as even Tarfl could determine, the spacecraft had indeed been destroyed in a bad landing by their operatives, who had been trained in simulators but clearly had never landed such a vehicle before that way.

So, to Tarfl, business as usual. They began to build another space patrol craft to replace the lost one, ready for a similar mission in the future.

Idealiana regularly “chatted” from her Holovision nook in the lunar station, with Artesiana in a similar Holovision nook in her office at GEOSpaceDock1. Idealiana had the vision, and could inspire Artesiana to make it happen physically. The next new kind of task in GEO was to build a prototype Total Recycling Plant.

The basic technology for making such a thing had existed for eons, in the form of primitive early mass

spectrometers. The basic principles were just being applied here in a big way. And it was to be entirely solar powered, self-sustaining. From the pure materials it would extract from the trash, it would have the ability to build a replica of itself, as well as make spare parts for long term maintenance. At least, that was what was hoped.

The Total Recycling Plant was not a glamorous assignment. Dealing with garbage rarely was. In this case, the main assignment for the recycler was to dispose of various extremely toxic industrial waste products. It was a 3Musketeers project, as Tarfl felt it was not profitable, and there was always someplace to dump their garbage. It had been dumped too many times into 3Musketeers space, however, thus their attention to the project.

The basic components for the first one had to be fabricated on the ground then freighted up along the carousel escalator to GEOSpaceDock1. The prototype was to be only a fraction of the size of the standard one to be built, based on what was learned from the first one. The huge and highly successful Solar Power Plants were being assembled on the Indonesian side of SpaceDock; three of them were already beaming Terrawatts of environmentally friendly energy to several countries; three more were being built simultaneously, and they had orders for 21 more to be built as fast as possible. Nearly every country around the world wanted them, and wanted them now, to no longer be a dying energy starved nation.

There did not seem to be any room off in that vast free-fall assembly area on the Indonesian side. The other direction from SpaceDock1 was selected for the recycler tasks. But as soon as Tarfl found out about that plan, they declared no way, that was to be where

their new big hotels were to be built, handy for passengers embarking at the SpaceDock.

The eventual junk materials flow up the carousel escalator was expected to be immense, when all was up and running. It needed to have an easy path to the recycling plant. Yet the hotel people would have none of it, the thought of tons of toxic trash being hauled continuously past their beautiful hotels, was not tolerable. The squabble was holding up even the prototype's construction, and they knew that things never worked perfectly the first time; there needed to be redesigns of everything along with prototype constructions based on what had been learned from the prior prototype. Time was needed; and the squabbling over where to put it was eating up that time. It was like before the first space escalator carousel was prototyped, the business haggles held it up for precious decades, during which the environment collapsed; which the carousel escalator, and the facilities it could enable built in GEO, could possibly have prevented that terrible collapse of the world ecosystem, and its resultant Great Famine and loss of most of the species on the planet. Now the squabbling was going on again.

Idealiana suggested that the first prototype be built on the Lunar surface, near StationBase1. It was the endless hard vacuum that was the essential for its functioning economically, and the lunar environment had a good supply of that vacuum just as GEO did. Besides, the little recycler would be useful at their tasks, even able to extract some ores that were so far not economical to process by using only local supplies and solar power. Even though the solar powered recycling plant could only operate a dozen days a month, due to the two week long lunar night, they could surely process materials while the sun was shining.

So it was agreed, the initial prototype development would happen on the lunar surface, not in GEO. Hopefully by the time the full sized ones were ready to be built and used in GEO for real, the decisions as to where to build them would have gotten settled. The GEO-lunar orbit transfer freighter was stocked with the components for the recycler, a special lander was designed and built to be the base station for this project and would land most of the larger components all at once. it landed a kilometer from StationBase1, looking much like the Apollo landers of the early 1970's, except was huge, having to be rocket propelled only from GEO. The major propellant use was for soft landing it on the lunar surface.

Idealiana was one of the first to ride the slow solar powered rover out to visit the new inhabitant of the Moon, blazing a dusty trail across the bleak lunar landscape, that would be the basis for a permanent road and railway soon. Much of the setup of this prototype would have to be done by hand.

This was to be a very tiny recycler plant, with a top throughput of perhaps 500 kilograms per day. What they learned about it was the most important part of it for now; yet Idealiana foresaw this recycler to be a key facility here for them from now on. It was a fairly flat horizontal plain on which the lander had arrived. Idealiana got out of the rover, went over to the huge lander, tied a tether to it, and walked out into the plain to the end of the tether, a hundred meters. She tied the loose end of the tether there to a stake, and pounded the stake into the lunar soil solidly. Returning to the lander, she untied the tether from the lander, then using the tether as a radius, she walked the 100 meter radius circle perimeter, driving in more stakes every 30 meters.

Next the 30 meter long curved segments were lifted off the lander, and placed around the circle, to simulate the similar structure needed in GEO where there was no lunar surface to hold things in specific places. Day's work done there, they returned to StationBase1 for mealtime and rest.

The next morning the crew assembled to do their usual calisthenics, laughter yoga, and meditation after breakfast, then held a review of the day's plans. Two were still coping with the exoskeleton assist for their arms, like robot arms from their shoulders to their wrists. The exoskeleton assists had enabled them to get back on the job even the day of the attack, but were needed for months, since the Tarfl operators' kickboxing had really efficiently smashed up their arm bones as they defended their heads with their arms, but had bought them a few seconds of life, enough for the kick boxers to be deprived of that weapon, too. Not complaining now, glad to be alive, they had adapted to the temporary life partly like a robot. It was enough they could handle eating utensils, for example, which they applied with enthusiasm this breakfast.

Idealiana introduced them to the total recycler's basic principles. It is just a very large but primitive type of mass spectrometer, she explained. The material to be processed was first converted into an ionized plasma by the intense radiant energy focused from the sun onto their container, the particles were constrained to a vector speed and direction, and then loosed as they sped past a permanent magnet's field. Their direction was bent according to their mass-charge ratio, thus each element went off in its characteristic direction. Containers placed at those directions, along the circle gathered the pure material elements, restraining them according to their properties, gasses being pumped down from the collecting sphere, other elements such

as aluminum bouncing around in their collection sphere's insides until sticking to the wall somewhere.

When the collection containers were full, they would be swapped with an empty container, and the purified materials would be brought back for making things anew. Solar energy would be used to restore the materials that had been entropically decayed in the industrial fabrication processes, making the materials good as new once again. Or so the theory went. It was up to them now to make theory into practice, then on to the next stages of uses of the materials.

Most of the part where solar energy was focused onto a crucible to plasmatize a sample was built into the lander, along with the solar electric photovoltaics to power the electronics; all they had to do on that part was load a sample into the hopper, then observe where the stuff went as it exited the lander's magnetically-bent exit aperture. From then on, it was stay out of the way. They put a wall up blocking the view of StationBase1 and its ore processing facilities, and the Quinoa greenhouse, as the impurities of the first samples would head off with no catchers for them yet. They set up catchers at the locations that preliminary calculations predicted that aluminum, silicon, and oxygen would land, to test the catcher's functionality as well as the actual beam direction and width at the catcher sites.

They placed a sample of lunar ore which they already roughly knew its composition, then activated the recycling machine. it unfurled its parabolic reflectors around the crucible, aimed in the direction of the Sun. Thousands of solar radiant watts focused on the small rock sample, which in seconds exploded into ionized vapor, headed down the path to be deflected by the magnetic field at the exit aperture, sped on through the

low lunar gravity to impact somewhere. It was all over in seconds; they went out to their catchers, and observed the electrometer deflection to see how much charge had been imparted by catching charged particles. A tedious task ensued, where they moved the catchers a little bit, put another similar mass sample of the same or in to be vaporized, go out to observe the electrometer, plot amplitude versus position. Then placing the catcher in the peak area of that diagram of caught intensities, they varied the catcher's aperture size, plotting the charge received function versus size of the hole they went through. More got in the larger the hole got, until it was bigger than the effective ion beam width, then particles began escaping the catcher, dropping the number of particles it caught, and dropping the electrometer reading proportionally.

Then they grounded the catchers to an instrumentation line they placed around the circle, and installed microammeters between each catcher and the ground wire, and then observed the current flow from each sample, making the observation possible to be telemetered to StationBase1, while uniform sized pellets were dropped into the crucible and vaporized, it all being a repetitive process of about one a second at this point. Then they weighed their catchers, weighed the ore aggregate mass, set it up with the crushed ore dropping into the crucible and being puffed out toward the circle of catchers; and left running by itself for ten hours. The catchers were retrieved, brought back to StationBase1 and again weighed to see the recovery efficiency. All fairly crude technique, but they got it done; while the people in GEO and on earthsurface were still squabbling to get the real machine located somewhere else except where they wanted to be in GEO, the typical problem with trash handling. Nobody wants to take the trash out, or haul it, or dispose of it; and definitely wants it elsewhere. It is all a messy

process. Yet if it was not removed it would foul one's nest. So what they were doing here is preparing a step in the cleaning up of their nest. And they were doing it to stuff that nature, even in her finest condition, could not biologically recycle.

Their experimental results sent to the engineers, their part of the job was done. They had the lunar prototype available, it was theirs to keep. Primitive; yet they kept it running, put out more catchers so as to gather some of the elements that their other processes could not obtain from the lunar ore. occasionally they would go out and fill the hopper with marble sized chunks of ore, and collect some of the catchers, and leave the recycler to do its thing when the sun shines.

In the GEOSpaceDock, room for engineering to go on directly there had been built, along with basic machining and electronic fabrication facilities; so now the development cycle was shortened a lot, no longer always needing to commute up and down the carousel escalator. The escalator trip itself only took 5 and a half hours, going up or down, but the commute after that, from the Andes Mountains in Ecuador to cities elsewhere in the world, was what took the time.

A next version of the prototype was built, this time intended for use on the lunar environment; it was built into another lander configuration, shuttled over to lunar orbit by the GEO-Lunar orbital transfer freighter, and soft landed in a new place yet still near StationBase1, so that it could be evaluated by personnel already there.

Idealiana and her crew were not as enthusiastic this time, yet made the trip out to the new recycler's landing site as soon as it had landed. This time all they had to do was pull equipment bays down, drag out tubing for a

ring that would lay on the ground to make the circle, attach the new type catchers on their marked locations. It came with a group of materials to be separated into component elements, samples that were precisely known in composition already. turn the power switch on; it was fully automated from there on, unfurling its huge solar concentration reflector and photovoltaics for its internal electrical power. They recorded a few meter readings, aimed its communication laser at StationBase1 to supply data to be uplinked to the engineers in GEO. They were getting data three hours after landing; the team was getting good.

And when the latest recycler prototype had been evaluated and data delivered back to the designers, the lunar processing site had another way to totally process lunar ores, as well as some of the scrap such as from the Tarfl patrol craft's bent landing strut.

Idealiana had decided that the presumably destroyed patrol experimental craft could be an asset in the future, since even though it had been proclaimed to be built just to patrol around in GEO, it clearly had been designed to land and take off from the Moon. It still had the fuel in it to return to GEO, for example; so they instead fabricated and attached a new landing strut to replace the one crumpled in it landing, and built a pseudo ore mound heaped over the spot where the patrol spacecraft was hidden. Maybe someday it would be needed; maybe fuel brought in for a more extended mission. No one at the station knew how to fly the thing, however, as Tarfl had the only training simulators. So for now it was merely a collector's item, along with the two prototype total recycling plants.

A few more months and engineering was ramped up to full speed in the new GEO engineering development facilities. They still had the same agreement as the first

joint project with Tarfl, that for each Tarfl engineer on the job in a 3Musketeers plant, a 3Musketeers fledgling engineer would be learning from him/her on the job. Already there were fully qualified 3Musketeers engineers on the job, who had originally been flunkies back in the original sliding armature plant facilities, working with Tarfl engineers.

The Total recycling Plant facilities had been put on the back burner, as the data from the early automated ore processor, which were part of the lunar StationBase1, had been assimilated and a new generation of lunar ore semi-automated processors were designed and prototypes being machined and assembled in the new GEO facilities. Soon another lander was being shuttled over to lunar orbit, and down to the surface near StationBase1 again. It was getting harder to find a clear landing area near the facility, there being piles of processed ore, besides the equipment scattered around. Deployment did not need to be fully automated since there were the staff there to help deploy components from the lander, saving a lot of engineering and prototyping effort. However, the station staff still had to work in spacesuits, which did not permit a fine touch to tweak adjustments. To do that, the subassemblies had to be carried into the station, subjected to atmospheric pressure, while being set up by the crew in the shirtsleeve environment inside the lunar station. Then the equipment was again subjected to depressurization when it was returned to the lunar landscape to do whatever its job was.

These new ore processors were still chemically based processing, intensively using solar energy; yet one had a small mass spectrometer that was part of its evaluation section. Interestingly, this small mass spectrometer did double duty in that when it was not being used to monitor the input and output of the ore

processor, it was shifted over to do a micro version of the big total recycling units, gathering trace quantities of some otherwise rare elements. These small quantities could be useful in making integrated circuits and micromachines, even in the small quantities being produced as a byproduct of the primary ore processing. The little mass spectrometer still bent the path of its ionized particles according to their ratio of mass to electrical charge; but did not use buckets to collect the distributed elements, instead using their kinetic energy to bury them into a foam strip. Calibrated places along the strip would have the kinetically embedded particle bunches, which could be cut apart and the pieces then baked or dissolved to release their special collection of purified material, even the gasses. The noble gases were all grouped in one bunch, however, not being bent at all due to their lack of charge; yet still propelled fast enough to be embedded in the strip material, to be baked out later in lab facilities.

Transporting the huge aluminum subsections from the lunar surface over to GEO was still a big problem. It was a problem that had slid through the crack in the whole project to build cities in GEO, in fact. The sections could be hauled up an anchored tether, either through L-1 toward the Earth, or at L-2 on the farside of the Moon, away from the Earth. Either tether could be built of space-manufactured fiberglass. A space carousel escalator could be built from the lunar surface, one version could loop from the lunar farside around to connect with L-1 on the earthside of the Moon; the other possibility was from the center of the earth-facing side of the moon, around to no further than L-2 above the farside of the Moon, without having the escalator structure be highly tensile stressed.

O'Neil type mass launchers could be built to heft buckets of lunar soil up to where it could be processed

and fabricated into the required structural members. And the buckets could be ingots of metals processed on the lunar surface. How and where to do the catching was the problem; anywhere there would be the preservation of momentum of catcher and caught masses. The catcher would not stay still, unless it had a reaction motor for station keeping. And that used up precious resources.

Whatever was used, it was going to have to be done big time. the structural members and aluminum dual hull skin over them, to build places for 10,000 people to live per city, to move a million people a day for 20 years, meant building homes for them in GEO at the same rate. It would require building 100 cities per day. That was a lot of aluminum, a lot of delivery. The task had always seemed utterly impossible from the beginning, crazy beyond crazy; yet it was now showing signs of possibly being doable although a task still almost beyond comprehension.

It had been said long ago by a powerful team, that the impossible just takes a little bit longer to do. They needed that motto right now, again.

Chapter 25 Three-in-one people

There were too many events that had not gone through executed flawlessly, Rationallo thought. Disciplinary assaults were intended to get rid of dysfunction in the hierarchy, and set an example in case of any others that might be tempted to not rigidly follow orders. Now a second disciplinary assault happened, this one in space, which was really more of 3Musketeers territory than that of Tarfl. Like the failure of the Idealiana's doctor disciplinarian action, which had been conducted in 3Musketeers territory.

Despite the intelligence gathering powers of Tarfl, surely the finest ever anywhere in human history, something had gone wrong in each case recently. The crash of his "patrol" assault spacecraft on the moon, and loss of three more of his best men, showed that something needed fixing.

His top position in the Tarfl hierarchy proved his top competency in correct analysis and determination of optimum courses of action. His formal job of daily adding up the profits of all their subsidiaries and posting them for all to see, was nothing; his real effectiveness was in the arena of the things that really got people to do what was wanted of them by those who were supreme. Analysis and problem solving was one of his expertise in that arena. Time to do that some more.

Searching the internet databases for factors missed before, he found a theory that indicated that people were each like a totem pole of creatures, each sitting on top of the other, and all dependent on the each other. This was at the heart of the 3Musketeers

philosophy, the enemy to his present thinking. So he needed to understand his quarry a bit more, to succeed in the hunt and takedown, feast for Tarfl.

Three creatures, stacked one on top of each other ... a weird picture. Each individual, the theory seemed to go, had some kind of reptile on the bottom, a mammalian animal in the middle, and a magician on the top. Different people had different creatures in those positions. The reptiles and mammals were all extinct now, or most of them and the others going; there was no need of any being using the Earth other than man, anyway. No animals, meant more room for people.

Although it had not worked out that way, he mused. Those animals were the prior food supply, and they all had somehow interlinked to keep it all thriving in balance, until man came along and gobbled it all up and trashed the rest. The superiors win, of course; the powerful thrive and breed the next generation's population to be like themselves, their progeny. Now man was king. Actually, man was all there was anymore. And man thrived through accumulation and reproduction of knowledge and its application. Understand your quarry and hunt it down and kill and devour it, that was what has always worked.

And he now had to do that, although this quarry was a bit more ephemeral than one of those extinct deer. Was the quarry physical people opposing him, or was it something in the knowledge and application arena?

He read on about the three creatures stack theory. Each of the creatures, the reptile, the mammal, the magician, interlinked with the others of their own kind, that is, each person's mammal linked with the mammal of other people, about mammal things. The reptiles interacted about reptile concerns. And the magicians

interacted about imagination and interpretation and planning things.

So he pictured a group of people together. They would be these bunches of three stacked vertically, yet each of the three were linked with the others of their kind, making three levels or planes of existence. That would be the game board, like three chess games going on all the time, one atop the other. And at the same time, the pieces on the game board had to move vertically tied together. interesting. Could he create a computer program to simulate that?

He owned the best of the computers remaining in the world, preserved from before the Great Famine of Energy and Food era. That reminded him, he had received intelligence that the 3Musketters facility on the Moon was acquiring small amounts of materials that they were going to use to build the first integrated circuits made since the Great Famine's dark ages. It was an effort worthy of his special support, if he could get his hands on it.

Anyway, if anyone could simulate the three-level chessboard, he could do it, having the best remaining computers in existence. It would give the computers something better to do than just keep track of who was better than whom in the Tarfl Political Corporation, in incredible detail that it was.

So how would that go ... one person's ox-mammalian would interact with the adjacent person's rhino-mammalian, which also interacted with another person's whale-mammalian While also those individuals' alligator-reptile interacted with another's snake-reptilian; and one's magician of one kind interacted with another person's magician of another kind. Three kinds of zoos which were tied together

vertically in places. A difficult, but not impossible, game board to simulate on his computer.

Then he would need to identify the corresponding zoo critter type for the real people around him and in his world. Plug it in and see what the computer came up with.

The kind of zoo-critter would be identified by its characteristic ways. and that is something he could measure and record for each person. Rather than be snakes, lizards, monkeys, rhinos, whales, they would be an animal composed of reptilian natures, another composed of mammalian natures, and the third a critter composed of specific magical ways of intellect, imagination, interpretation ways.

In different people, their critters would vary in how powerful the critter was. Some people would have a more powerful reptile kind, such as an alligator where another person's was a garter snake; the more powerful one would correspond to a person identified as a Sensual in Jungian psychology, or an Artisan in Kiersayan psychology, people who were characteristically more powerful in the physical action world, got things done in reality.

It was the old "Tri-Brain" concept in some ways. The brain's R-Complex was the reptilian critter; the Limbic part of the brain corresponded to the mammalian critter; and the brain's cerebral cortex corresponded to the Magician critter. But in the current theory, the critters of each kind were interacting in their characteristic ways with the corresponding level critter in other people, all the time. Three worlds happening simultaneously, yet also tied to the other worlds wherever an individual person was.

But what was observable in the real world of people, was each of the individual people, seemingly one critter, not three.

A “three-ring-circus” he mused. Each person was an ongoing three-ring-circus all the time. Interesting. How would that concept help him control his world more effectively?

Chapter 26 Re-hashing how it happened

“So how did those 3Musketeers slackers,” Guardiano asked, “manage to get the space carousel escalator project going? They have no business sense, are just menial workers for the most part, and not one of them could stand up to either you or I in the ring for two minutes. Yet now they are bringing in profit from their solar power satellites electric beamed power that is a quarter of Tarfl’s aggregate profits. It does not make sense.”

“I looked into that” Rationallo mused. “It was a complicated history. And in fact, if Tarfl had not stepped in and provided engineering expertise and investment money, they might not yet have a single power satellite up and making money, especially after we destroyed their sliding armature segment manufacturing plant with its engineers and technicians. And, as you know, we would not have come up with that money without seeing the advantage in the long run of having them complete their dream of a ring of cities in orbit.”

“But you did ask how did they get it going. Tracking the technological concept begats would take us all the way back to the stone hatchet, I suppose. There was a key turning point, when several concepts that were nibbling away at the idea of using kinetic energy to maintain a structure that could help access space more efficiently than conventional reaction engine rocketry could do, were combined such that the weaknesses of the progenitor concepts were canceled out by a particular combination of the earlier ideas. The man who came up with the way to do the escalator such that everything fell in place neatly, unfortunately, was not a prominent man.

“You know how we need to be sure of things before we commit investors money in a project. Any manager that does not do that is soon not a manager anymore. We count on the reputation of a person, to evaluate the person’s concepts’ credibility. It is not always easy to evaluate a concept directly ourselves, especially if it is really a way that is not directly in line with our existing chain of command orientations toward knowledge.

And although this was a time before the united corporation formal accord to ban all innovations, most of innovating in this country had effectively been blocked by the “employment agreements” forced upon technical employees as a condition for employment, that handed over all their ideas to the corporation freely, with no requirement that the corporation pay them for those innovation keys, nor obligation by the employer to do anything with the ideas. Thus, ideas were a dead ball in the game of business.

But there were some technical people who would just not give up. They believed more in their concepts than in the wisdom of keeping a low profile. Mavericks, they were, and the corporations identified them, and put the squeeze on them. It took time to crush them in such a way that it was not traceable to the corporations. And in that time, sometimes an idea got out into the world.

“And the basis for the space carousel escalator was one of them. He started putting the basics of the idea on one of the national computer public networks before the internet became widely public, then he kept putting the concept on internet web pages where all could see. That all was in total incomprehensibility to corporate and academic thinking, he was giving it away freely. On his previous related concepts in large scale transportation innovations, the corporations simply would have an investigator go in and clean out every

trace of record that he had the idea, thus he could not get a patent nor financing, so the concepts died there. The guy was barely surviving financially, and his woman was long gone, friendless, corporately blacklisted so he could not get a good job anymore, yet he kept on, he had no sense.

“He submitted papers to space related conferences year after year, yet was righteously ignored. But finally one conference had some leaders that believed more in concept validity and potential to help humanity, than in following standard business aims. And so the guy made a space conference presentation on the concept and got a paper published in a conference proceedings.

“And another conference too, despite the increased requirements for presentations, peer reviews, making camera ready copy; the guy did it all himself. Normally it takes a whole staff of people to do those functions, and they knew he was struggling alone, yet to their amazement he did it. By the next conference, they had sent in troublemakers to harass the employers of those who had supported presentation of those papers. And so the third conference, he again got a paper published, but the conference was set up so no one would be able to attend his presentation, delayed until long after the conference was over, in an obscure place, and his presentation was heckled by top management, and was totally ignored afterward. All good business techniques, of course.

“So another group focused on that kind of thing, especially bringing up the old idea of an anchored tether centrifugally supported tether out through GEO, like there were possibilities of the super strength material needed for that, on the near horizon, competition to the carousel way of doing it. He

presented three papers at that conference, again at its end, and with hecklers in the audience to disrupt the man not trained in doing presentations, he just was winging it at everything and was somehow still going. So they just endlessly delayed publication of those papers until it was forgotten; the conference presenters employer was put on huge pressure by troublemakers sent in to do ugly stuff.

“So why did that not kill the concept? The guy had grown old by then, still living in poverty, and though not giving up, just faded away obstinately still trying. One does not live forever, and they made life quite miserable for him. Anyone with good sense would have seen the light long before and quit trying to get the concept accepted. But he stubbornly kept at it, believing in humanity’s wisdom instead of business power principles in action.

“The great corporations casually smoke screened and badmouthed the guy and the carousel concept, while they gayly went on with business as usual, living the good life. Winners always win, losers lose. Some losers simply don’t quit, however, even though lose they must. And that guy was one of them.

“The guy was gone, but his writings still had not been fully eradicated in published papers and in internet pages. Some internet-written science fiction had been written by the guy, also was loose in the public knowledge base. And so after the Great Famine dark ages had been passed, some of that concept was still available, and the 3Musketeers found it. Tarfl could not touch it since it was full of requirements for innovation; so it was against our principles to deal with such a thing. The 3Musketeers saw it as a way to save the kind of humanity that they were, even had fantasies of making the planetary environment get running again

through restoration. They did some incredible things with the vision, I must admit. And so here we are.”

Guardiano had intently followed all that. “It is interesting to see how our ways of being, our traditions, slowly change in response to the pressures of reality. This will be an interesting example of what happens when traditions are flouted, bringing disaster upon those who do not honor tradition's proven ways.

“It had been agreed among all the great corporations to cease innovating technically, preventing costs of competition and thus increasing profits for all. It therefore became a fine tradition to be honored. Yet that guy, and then later the 3 Musketeers, terribly defied tradition, even the business practices and chain of commands of his day, to get that carousel concept into common knowledge, disgusting innovation stuff it is. Even many in Tarfl are eager to move to live in the cities in GEOrbit, where they won't need to be dependent on the digestion vats anymore, but have a return of agriculture powered by endless sunlight availability up there. But it all will be the progeny of innovation, and will bring disaster therefore to them all. When the Leroy Brown Society prevents them from doing their abominable innovative changes to restore the environmental balance, and prevent their return along the carousel escalator to their homes and businesses on the ground, they all will perish up there, and the world will belong forevermore to the true believers who honor our business traditions.”

Chapter 27 The first lunar space carousel

The 3Musketeers Political Corporation's Space Carousel Escalator to GEO management was having another difficult decision, that of how best to provide the huge rate of delivery of ribbed panels to GEO from the Moon.

A non-tapered anchored tether either through L-1 or L-2 would require bringing huge amounts of carbon fiber tether material from GEO to the L1 or L2 balance point, then de-spoiled in both directions carefully balanced until the tether could be secured on the lunar anchor point, then unbalance it slightly to provide more weight on the side away from the Moon, so as to provide the margin of upward bias to maintain it in place. The bias would have to be greater than any conceivable load combination below the Libration point. All the mass of the aluminum for the ribbed panels would have to be lifted up the tether space elevator, a huge mass flow. If something were to temporarily halt the mass flow, all the bias in the tether's outward stretch would fall on the tether itself. If the tether were to break somewhere on the lunar side, the Lagrange point facilities and the outward counterbalance would all go flung out away from the Moon, and especially if through L1, it could head for the GEO belt, wreaking havoc. That could not be risked. Even a tether through L2 was at such risk.

And a fiberglass tether space elevator either through L1 or L2, made of lunar fiberglass and therefore not needing much Earth resources to build the tether, would need to be tapered to maintain constant stress in its cross-section, widest at the Lagrange point. But it too would have the same risks in case of breakage.

The technology for the gigawatt lasers, needed to beam power to the elevators, did not survive the Great Famine, so they would have to have to build tracking solar reflectors aimed at the receiver on each elevator. The heat re-radiators on the electric tractors climbing up and down the tether would be huge, too, and that would be more weight lifted than was not payload. And the elevator could only operate half of each month during the lunar daytime.

The elevators would need to be built in pairs, joined at the Lagrange point by a bridge, to shuttle over the lift tugs to go up one tether, down the other. There was the risk of tethers lashing about under changing loads, and hitting each other could be disastrous.

Therefore they decided to build another carousel space escalator, but this one on the Moon, anchored at the Earth-facing center of the Moon, and lifting loads up to L2 above the far side of the Moon, from where reaction engine propulsion would be used to tug it over to GEO and place it into the ongoing construction slot.

That meant that L2, the Lagrange libration point above the farside of the Moon, where the gravitational attraction of the Moon and Earth beyond the Moon, was balanced by the opposite direction centrifugal force of the angular velocity of the Moon's 28 day rotation around the Earth, would become the major materials assembly plant for the GEO space cities, and for the next generations of satellite solar power plants in GEO and Total Recycling Plants there.

Using the engineering designs for the original lunar StationBase1, another lander was prepared at GEOSoaceDock1, which was then moved over into lunar orbit by the same old GEO-lunar orbital transfer vehicle. At the correct place in the orbit, it initiated

decent, and landed close to the center of the Moon, as seen from the Earth. A new crew, of course, and upon landing, they went through the same routine of bulldozing out a hole for the StationBase, rolling the basic shell in, and bulldozing to cover it back up, leaving trenches for the next sections, and access to the airlock.

But this time they brought their own rover vehicle, as there was no Apollo lander site to cannibalize for one here. Besides, they got to build one that they could work inside, as a shirtsleeve environment, easier to handle things inside, but put more distance between the operators and the working surfaces of the Moon than would spacesuits, which had advantages and disadvantages. It was an engineering prototype, so was heavily telemetered back to GEO as it went about setting up the basalt melt reflector for the new brick factory. It had cranked out a half dozen basalt bricks before the lunar day terminator passed them and the 14 day night began, and the crew retired to the buried initial part of lunar StationBase2, running on minimum power from the batteries, time to rest and rehash how things had proceeded so far, and get ready for the next 14 day effort out on the surface.

The two lunar StationBases had direct voice communications on the old AM band, the earth station's signals too weak to interfere much. But for high data rate exchange, they had to bounce their communications off of GEOSpaceDock1 communication link. They got their internet connection from there, anyway.

Among other things, the telemetry was providing wear rate information for the moving equipment in the lunar environment, from which to predict which spare parts would need sending on the next supply mission.

Instead of the exploratory lunar ore roving prospector and ore processing plants, their lander carried a pair of rocket propelled vehicles, each carrying a spool of tubing containing micro sliding armature segments, and a socket assembly. From GEOSpaceDock1 a one-way vehicle was launched to lunar L2, and once it had arrived at L2, it settled in with an orientation aligned to the lunar orbital plane.

Similarly, at lunar StationBase2, a trench was dug at lunar dawn's arising's solar influx energy availability. Inside it was placed the launcher for the two rocket propelled despoolers, each aimed in opposite directions along the lunar orbital plane. The launcher was encased by the basalt bricks as fast as they became available, welded in place together by molten lunar glass. The bricks were piled high above the launcher, weight that might be needed.

This was to be a completely experimental space carousel escalator, to gain data about stress levels in the overall structure, to then be used in a scaled up version. Another version would be scaled up from that one's data, and that one hopefully would be fully able to carry the loads for the building of the ribbed shell structures for the full sized wheel-like Stanford Torus space settlements in GEO. It in turn would be used only to build a thousand of the cities, then it would be shutdown to defer to the next version, designed and built with the experience gained by then, for use in the long haul, continuous running for the next 20 years.

But for now, they needed to put the first one up, only a few millimeters in diameter. It would be easier than on earth, since there was no atmosphere to impede vehicles. The two despooling launch vehicles were readied, aimed in opposite directions, They were to be

guided from the two Hologram stations, one by Idealiana at lunar Stationbase1, the other by Artesiana in GEOSpaceDock1's Hologram nook.

It was time to launch. Idealiana got into her Hologram nook, and merged it with one of the despooling launch vehicles over in the trench at lunar StationBase2. Artesiana's virtual presence was neighboring; they each felt like pilots in large spaceships made of transparent parts and colorful energy flows among the parts; the spool looked like the fish line spool of a fly casting fishing rod to her, the centerline of the coiled tubing being along the line of deployment, the coil lying across the line of deployment perpendicularly. Through the nook's link, Idealiana and Artesiana looked at each other, waved at each other; they too looked like glass artwork with colorful energy flows of vast yet coherent complexity, to each other, as their own bodies did to themselves. Artesiana closed the switch for activation at her site, then when Idealiana closed her corresponding switch, the launcher at lunar StationBase2 activated, firing their rockets while also being fired by an explosive charge like a pair of bullets so as to gain a high velocity quickly, and they were off. Their task as pilots was to fire the lateral thrusters so as to continually stay as close as possible to the machine-visualized optimum trajectory; the fish line-like tubing was being laid out as planned, and was in freefall as soon as deployed. The vehicles velocity was quite high at first, slowing as they gained velocity, traveling at opposite directions around the Moon, ever climbing higher. Higher and slower, flying to keep crossing the optimal line, the target coming into range, the docking port in the waiting L2 facility in the sights, it must be hit exactly center and within microseconds of when the other vehicle struck the other side of the L2 facility. Closer and closer to L2, a few km/s too fast, slowing, the resulting deformation in the deployed

tubing within predicted acceptable limits. Bulls eye target right on, then an impact that was more sensed than felt, as the two spacecraft rammed the L2 docking ports almost simultaneously from opposite directions. The section of tubing within the L2 facility filled in the gap.

At the time the two teleoperated spacecraft were launched from the trench at lunar SpaceBase2 site, the electromagnetic drivers began pouring the micro sliding armature segments into each of the tubes being even then just begun to be emplaced ever higher around the lunar globe, the mass streams being in opposite directions in the two sections of each tube. so by the time the tubing pairs had rammed into their sockets in the L2 facility, the armature segments were also arriving up the tubing from both sides. The leading armature segments passed by each other in the L2 segment, then began their plunges down around back toward the lunar surface StationBase2 facility. When the armature segments reached their starting point at the launch facility, their positions were sensed and their velocity was normalized as they traveled through the synchronous electromagnetic mass driver. When the feedback oscillations calmed down, the carousel was declared up and running. and idealiana and Artesiana disconnected from their Holovision nooks, and went for well-earned break times.

The first lunar space carousel was operating. The telemetry was monitoring the dynamic stresses as the feedback positioned system strove for stability, and it all was a learning exercise; it would not lift anything itself. Its life experience would provide the reality data for designing the next version, which would include a lift capacity as an added set of variables. For now, job well done.

Chapter 28 Musclemen still rule the carousel

So far, the ability of the Holovision to provide a 4 dimensional detailed analog of the complex interrelated systems to the human mind, had been working wonders for integrating the various engineering areas, so that things were working the first time, amazingly. Data had to be gathered by interim models, so as to make the Holovision model more comprehensive, but once reality was measured, and the applicability of each bit of reality ascertained toward the new task, the Holovision provided the holistic big picture full of the details if one wanted to focus on them.

But the human element was far more complex than the Holovision could model sufficiently accurately for all occasions. It did integrate the tri-brain model of a person well, the basis for the 3Musketeers practiced philosophy. But it had not dealt with the kinds of ways so prevalent in the Tarfl practiced way, which might be called “drunk with power” in general. There had been an old saying, that power corrupts, and absolute power tends to corrupt absolutely.

And Tarfl had been in absolute power for a very long time. Is there more to the story than the ancient “muscleman smashed brainy boy into pieces, grabs both girls, fathered all the children, and so the next generation was just musclemen”? Tarfl Political Corporation's secret enforcement arm, the Leroy Brown Society, surely typified that ancient mammalian inhuman herdbeast mind detour; but it was not all of Tarfl. It did provide the drama to stimulate excitement, the kind of drama that was not of mankind working together to create new works to help all, such as the carousel escalator and solar power satellites were. The

urge to show who was better than who, kept interrupting the flow of human civilization as the warriors battled it out, getting the attention that had actually been needed for survival of parts of humanity. The warriors did not care about that, of course. Who beat whom to be the winner and take all the women to make the next generation, was all that counted in that simple but effective way of being. Lots easier than doing the building itself.

And so Rationallo's replacement "patrol" spacecraft got finished at GEOSpaceDock1. This time, it was not going to botch the job of eradicating Idealiana as a potential witness about the Leroy Brown Society's deadly mischief doings, that kept most people in line through simple quiet terror. And this time Rationallo himself was going to be part of the crew, to make sure it went smoothly, and get the job done. They couldn't have a second "accidental" loss of a rocket grenade that hits the lunar StationBase1, where he knew Idealiana was hiding out.

The new Tarfl patrol spacecraft tooled around the various facilities in GEO, past the hotels being built, past the Total Recycling plant, past the group of Satellite Solar Power Plants being built; on a test run, getting familiar with the feel of the spacecraft, and assuring any onlookers that all was well with the use of the patrol craft.

Rationallo did not like cooling his heels in GEO very long, away from his duties at Earth surface Tarfl corporate headquarters. So the next test flight was made to the new facilities being built at lunar L2. They actually did not have any jurisdiction at L2 since the facilities there had been built entirely out of the profits 3Musketters was reaping from sale of electric power from their power satellites in GEO; but they came

anyway, partly to seek firsthand data about what was really going on there; Tarfl had to have intimate knowledge of everything that transpired anywhere, to be able to control it all effectively, whether it had the right (or wisdom) to control it all or not.

The patrol spacecraft watched the coming and unloading of several freighters that rode the tiny escalator up to GEO from the Moon, and then watched as they returned empty down the other side of the carousel escalator, back to the Moon. It was all automated, and there were no windows to watch the patrol craft; no one in 3Musketeers had foreseen invaders from outer space. Or from anywhere, for that matter. Who would be so stupid so as to want to interfere with this desperately needed project?

Donning spacesuits, Rationallo and his two crewmen left the patrol craft and went to the holding area of the freighters waiting for a turn to begin their descent back to the Moon. They picked one that was several back in line, and a brief inspection found it to be a miniature version of the ones in use on Earth's carousel elevator. A basic design quite documented by Tarfl by now, and so it was a simple matter to disconnect the electrodynamic braking power lines. Back in the patrol craft, they quickly returned to their dock at GEOSpaceDock1, and made themselves obviously present there. No one had known they had been to L2. "Bye bye Idealiana, nice knowing you" Rationallo muttered to himself, with a smile.

Idealiana was in a shirtsleeve environment interior lunar bulldozer, almost completed the road across hundreds of lunar miles to join the two StationBases, and in sight of stationBase2, when it happened.

When the sabotaged freighter captive spacecraft got its turn to descend the carousel, it did not have electrodynamic coupling to the armature segments, and soon had sped to overtake the freighter that was ahead of it, and impacted. That freighter was empty, and would have supported the weight of the other freighter, but the impact also caused the magnetic levitation track clearance to go to zero due to the transient load. The rapid heating from friction overloaded its synchronous sensors, and caused the freighter to speed up instead of slow down; the two freighters sped down to impact the next freighter, and a cascade failure happened. About halfway down to the lunar surface, the carousel snapped in two, and the armature segments began spilling out into space at above orbital velocity, suddenly in freefall motion. The stator with its loads of freighters no longer fully supported by the armature segments outward push, began to fall to the lunar surface, dragging the L2 station down with it.

A flash of movement caught Idealiana's eye, engrossed in picking the best path to scoop a roadway lightly in front of her vehicle. The carousel zigzag crumpled, slamming into StationBase2; pieces of the station and of the escalator careened wildly, some pieces hit near her vehicle. She stopped the bulldozer, realizing that there now was no destination for this road anymore, at least for now. She turned the dozer around and hurried back down her new road, back to StationBase1, to get to her Holovision nook to find out what had happened. If she had been there, maybe this could have been prevented, she thought.

At GEO SpaceDock1, Rationallo watched as the word came in, that there had been an accident that had destroyed the lunar carousel escalator, and its crash had destroyed the StationBase with loss of all hands.

“Bye, bye, Idealiana” he said to himself once again, and erased her from his mind. Then he strode into the 3 Musketeers main operations center, and proclaimed that the incompetence of the 3Musketeers was setting the schedule behind, and that to protect their portion of investment in the project, Tarfl was now taking control of the whole operation, so that such a thing would not happen again.

Back at lunar StationBase1, Idealiana exited the bulldozer’s docking port, and ran to her Holovision nook and activated it. Artesiana was in her Holovision nook, where she had been monitoring the lunar escalator’s routine operations. She related to Idealiana that somehow there were alarms triggered that one of the freighters in the L2 waiting section had suddenly suffered catastrophic failure of its dynamic braking system, while it was sitting motionless and de-powered except for basic monitor functions. Artesiana had merged with the vehicle, saw that the wires had been deliberately disconnected manually, where there had been no human presence at L2 to do that. And she had followed the cascade failure resulting, helpless to do anything about it. She also had learned that the new patrol ship was again out on an inspection mission, again with Rationallo himself on it. He was back at GEO by the time the failure happened, of course. It was not known where the patrol craft had gone, but it was gone when Artesiana found that human hands had deliberately sabotaged the freighter to cause the collapse of the elevator. “Keep radio silence from StationBase1” Artesiana advised Idealiana. Rationallo might not realize that there were two, not just one, lunar stationbases in existence. So Rationallo might once again have thought that Idealiana had been killed; let him think that for now, she advised.

Chapter 29 TANFL finishes the takeover

By the time Artesiana got to her office the next morning, she was not surprised to find a small desk in its back, and workmen finishing installation of a partition between it and the larger front part of the office, much as she had seen going on at the other offices along the way there. There were two of those huge burly Tarfl men, handsome and clothed in the best of casual business styles, standing in her office. One was Rationallo himself, she recognized. "Your desk is the one in the back, and this one in the main part of the office is my desk," Rationallo said to her without a greeting. She noted that her Holovision nook was not in her new part of the office, it was on his side. And that she would have to pass through his part of the office to get to what was left of hers. These Tarfl folk sure do move quickly and effectively, she thought to herself, and they don't care what they have to do to others to make their intentions happen.

"This is Ratiogorgino, one of my 35 brothers and is by the same mother, who is my office manager here while I am away", Rationallo continued. "You will supply him with all the information he requests, and do exactly as he tells you. We are going to get this space project back in operation immediately, and we won't mess it up with incompetence like you 3Musketeers did. And I remind you that you are still one of my wives-at-large, and if you do not fully comply with this directive, you will be immediately delivered to one of my HaremSpaces to finish your days of life being artificially bred before you go to the Digestion Vats." Turning to Ratiogorgino, he told him "Keep me informed of your progress here; immediately start construction of the full sized lunar carousel escalator. The previous one

provided all the engineering data for the scale up to full operational size.”

Rationallo turned and hurried out of the office. He was eager to get back to the Earth surface Tarfl headquarters, get his daily 15 minute formal job done, and this evening was the weekly meeting of the Leroy Brown Society, followed by his get together with his friend Guardiano. Besides, tomorrow it was time to artificially inseminate one of his HaremSpace enclosed wives.

Artesiana inspected her new office. It was bare except for the small desk, and a minimal computer terminal. She made a note to bring in some food and water and other survival necessities, as she also had observed that her office door, spring loaded shut, was unlockable only from Ratiogorgino’s side.

The Tarfl Political Corporation management personnel were powerfully efficient there as usual, even if more experienced in clothing manufacture and department store operations management.

Although Tarfl managed the space operations thereafter, the actual work was still done by 3Musketeer personnel. And much of the Tarfl directives were of the nature of “go make it happen”, letting the experienced 3Musketeers team actually figure out how to do the job, and to make it physical reality. And to take all the risks.

Artesiana made no effort to struggle to retain her position as general manager of the GEO space operations. Instead, she pleasantly slid into the role of Ratiogorgino’s secretary. When she made a bit of nuisance of herself walking through his office to go use the Holovision nook, which she had reminded him that

was part of her secretarial duties to do the filing of data in that nook, he had an extension of her office built so as to enable her access to the nook without going through his office a dozen times a day.

She spent her break times in the Holovision nook thereafter, connecting with Idealiana over in lunar StationBase1, which was subsisting on the greenhouse food, digestion vat product, and using their two total recycling units, as well as the prototype lunar prospector-ore-processors to bring ingots of aluminum and other materials back for their use occasionally, forgotten in the huge push to get the GEO space cities built as fast as possible.

Based on the latest observations of realities of Tarfl philosophy in action, Idealiana updated the Holovision's model of the human factor. Whereas the 3Musketees' ways tended to involve the ongoing of the tri-brain stack of three creature's worlds in loose interaction, the ongoing of the Tarfl people tended to be a world of bullies interacting. The model was updated to include the mode where people could be obsessed with continually measuring up to each other to determine whose was better than whose. The "better than" was measured in many ways, from wrestling to playing chess to running track to gaining PhD's to carrying on captivating conversation. A hierarchy was ever updated as per the ranking established in the "whose is better than whose" comparisons ever ongoing, and the hierarchical position determined the fraction of the goodies of life that were supplied them, particularly those of family inheritance and employment income; yet more fundamentally it generally determined their individual share of the prestige, wealth, and rights of mating to the best of women. This modified Holovision working model of social reality also connected with the tri-brain form of social interaction, in

that the bully's hierarchy considered any individual that achieved something, through hard struggle on the sidelines on something for years alone, and then openly showed his achievement publicly, that person was to be considered a fake, a phony, and surely a thief of the achievement which surely must instead have been done by the bully hierarchy as a product of their status reaching. The out-of-place person was therefore to be put back in his humble lowly status, branded a thief and a person who could not stay in his place, and the achievements were either destroyed or ascribed to have been done by one of the high hierarchy members. Thus stability was restored, all was well for the bully hierarchy again. This revised model of human reality now was what the Holovision used to process its whole picture display for Idealiana and Artesiana.

The two women also created a small portable version of the Holovision nook, a space helmet with goggles and earpieces and air aroma supply, that could be worn anywhere, the connectiveness retained with holistic space-time, although only on those three sensory levels; but it was at least some part of awareness that could perhaps be useful in some future coping with Tanfl's capers.

The new lunar StationBase3 was built right next to the ruins of StationBase2, as it too had to be built in the plane of the Moon's orbit around the Earth. Under Tanfl's watchful eye, a new L2 facility was built, this time for the full sized lunar carousel escalator, and built to be used as the manufacturing site for the full sized ribbed panels for construction of the Stanford Torus space cities to be built in GEO.

Robotics were used for nearly all the work at L2, partly because of the immense size of the objects they built

there and moved around during fabrication, but also because it had to proceed mindlessly efficient around the clock, day after day, year after year, for the next 20 years, producing and shipping the huge ribbed aluminum panels. People were needed only to maintain the robotics, and had to stay out of the way of the immense computer controlled robotic machines that had no awareness of human presence among them.

Since everything was ultimately powered by solar energy, even the reaction engine driven delivery of parts from L2 to GEO had to be thusly powered. Those engines used photovoltaics to produce the electricity which further accelerated lunar dust that had been converted into a plasma by focused solar energy, producing a combined very high specific impulse, although dependent on the solar energy quantity that the reflectors and photovoltaics could intercept from the Sun; those power gatherers had mass which added to what had to be moved and maneuvered, and so formed an effective limit on how big a load could be moved. So a standard aluminum ribbed shell structure section was determined, a 150 meter 90 degree arc structure, of a 300 meter portion of the toroidal outer circumference requiring 100 of the sections to form the whole toroid. The solar powered propulsion units made a one-way trip to GEO, their photovoltaics becoming incorporated in the GEO space cities electrical power supply, and the focused plasma generators being incorporated into each city's Total Recycling plant. Therefore much of the manufacturing done on the lunar surface and at Lunar L2 SpaceDock was to build the propulsion units.

Eventually production was ramped up to the steady pace of building 100 cities in GEO per day, and the internal outfitting of them to make the structures into homes, agriculture, and light industry for 10,000 people each, soon began to make the new real estate

available, first for those who wanted to live there permanently, then for those who would be willing to take up temporary residence there while the Earth surface ecosystem was scrubbed and jump-started with replacement organisms from what had been preserved from the past before the Great Energy and Food Famine age. Some of the cities would be used to create various special environments of the earth, such as snow areas, hot desserts and ocean areas, fresh water lakes, all great vacation areas for the people of the cities in GEO.

And Rationallo, Guardiano, and the rest of the Leroy Brown Society secretly solidly set in place their own plans; their vision's accomplishment to own the whole world clearly in sight. And Rationallo's sleepy dreams floated around the character of Turl in "Battlefield Earth", while Guardiano's dreams were around the character of Jack in "Jack and the Beanstalk."

Chapter 30 The Ark is built but guess what

There had been 36 of the residential Stanford Torus built and occupied before the 3Musketeers could build one to be Ark 1, a Stanford Torus dedicated to the preservation and expansion of species, for eventual restoration on the earth surface. This one was the best environmental simulation for large mammals from around the world, that were still living. Later they would be working to create from DNA specimens saved from species going extinct, but for now, they were using what animals they could still find alive and reproducing at the present time, few that they were. The environment included the supportive species, including the vegetation. The Stanford Torus Space Settlement design of 1976 was based on making it into 6 equal sized alternating sections, agriculture alternating with residential and light industry in the city version, and in the Ark versions, intensive agriculture devoted to raising food required by the species of animals, so they were not limited in population to the vegetation growing naturally. And the three sections that would have been condominiums, allowed some segregation of groups of animals.

By the time of the readiness of ark 1 for inhabitation, there had been lost two more species from the earth, that still had a small population still surviving in the lunar StationBase1's pet farm. So two mated pairs of each animal were brought from the pet farm to lunar StationBase3, to be smuggled aboard one of the shipments of the quarter-shell segments sent for the newer cities under construction at the time.

The lunar bulldozer had an enclosed shirtsleeve working environment for two people, and so Idealiana

prepared it for the long slow trip over to StationBase3, for herself and the 8 animals, two plant species, and supportive bacteria and insects. This made for a crowded interior, and a transfer crate was slung on the side of the dozer. She had camouflaged the dozer by adhering lunar regolith all over its exterior surfaces, including over some over panels to conceal its more obvious mechanical shapes.

She drove the dozer along the trail it had scooped several years ago, just before the destruction of the interim carousel escalator and StationBase2. Reaching the end of that trail, she drove over the regolith, not making further trail, although the dozer's tracks would be there for awhile. She arrived at StationBase3, got the animals and plants into the transfer crate after pressurizing it, and the personnel there took over the task of the surreptitious delivery to GEO, to avoid attracting attention of Tarfl to the existence of life at StationBase1. Turning the dozer around, Idealiana set the dozer blade to graze the trail it left behind, dragging a rake behind which tended to erase the dozer's tracks. Then she returned to her home at StationBase1, arriving before the end of the lunar day; the dozer was equipped to sit out a lunar night occupied, but it was not much more than bare survival in there, so she was glad to get back to the larger friendlier space of the StationBase's people, pet farm and greenhouses.

Eventually some 19 more years passed, and Tarfl was dealing with the last of the people coming to temporary homes in the cities in GEO. Each family was required to provide their home on the earth surface as collateral for the temporary condominium home in GEO, deed to be returned when the home in GEO was vacated at return to their home down below. Everybody had to go up, from everywhere on the earth surface, as there would be no supply of power or food for anybody. So

everybody made their way to the carousel escalator terminal.

The escalator had been lifting people and their household goods from the ground up to GEO at the design rate of a million people a day. Finally the earth was almost completely depopulated, a few more days' worth of people.

Tarfl management all left their offices in GEO to make sure of things on the ground were properly completed.

As the last people arrived in GEO, there was news of a problem, that all the young women somehow had disappeared, had not arrived in GEO with their families. There were almost half a million young women missing, it was determined. And Tarfl management could not be located to file reports. Finally, no more people arrived in GEO from the earth terminal, the task was done.

It was time for the 3Musketeers management to take over the task of restoring the earth ecosystem during the next couple of years, detoxifying it and replanting. However, when they arrived at earth terminal, they were fired upon; several were killed before they escaped back up the escalator. The 3Musketeers security guards held the escalator terminal site, but that was as far as they had jurisdiction. And they began to report attacks on them, and attempts to destroy the terminal.

3Musketeers' men came down the escalator from GEO, hundreds of thousands of them, but few weapons were available. The attackers were well armed and killed tens of thousands of 3Musketeers men before a perimeter was established defending the terminal, fenced around, and an impasse began.

By then it was realized that all the Tarfl people were not in GEO anymore, and presumably were on the ground; yet they could not be contacted to report the ongoing problems from marauders,

Actually, they were the marauders. Carrying out plans made over two decades before, the Leroy Brown Society members had blocked return of people to the ground, and declared all of earth now belonged to them. And they had kidnapped half a million of the more attractive young women from among the last immigrants going up to GEO, to form huge harems for the Leroy Brown Society men, the mainstay of Tarfl Political Corporation, which now owned the earth and all the abandoned factories, homes, and weapons. They declared that all those who had left their homes to live in GEO had gone astray, had not followed the laws of tradition, and therefore forfeited their claims of ownership. They were declared no longer members of the human race, and that the Tarfl men were in the process of creating the new human race of earth surface, to own it forevermore.

3Musketeers asked how will the cleansing and re-seeding of the earth's vast ecosystem be done with people still on the ground; Tarfl's reply was that there would be no such thing done, there was no need of it. All was business as usual.

After another year had passed, the 3Musketeers had pushed their territory out to include about 10 miles around the base of the escalator carousel terminal, but that is as far as they had resources to protect. The Tarfl men occasionally would conduct sorties against that perimeter, more for the sport of it, since Tarfl had the military arms of the arsenals of all the nations, thus could destroy 3Musketeers at a whim. No reason to bother, as their long term plan was going just fine, and

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included destroying the escalator itself, ending any hopes of the people in GEO to ever return, end of subject.

Tarfl's main concern was of how to run a world with so few people, and how to breed the kidnapped women as fast as possible to build up their population. The Earth and all its treasure was theirs, surely rightfully. Had they not made it so? The Earth had been abandoned, and so Tarfl had claimed ownership of all of it, by rights of salvage. They were the true followers of tradition, and the rewards were vast indeed.

Background Technology

Scenario

This adventure story plays out in a scenario formed by the Moon, the planet Earth, its Geostationary Earth Orbit, GEO, that is some 22,300 miles above the earth's equator which, as of the start of this novel, contains a ring of cities; and a transportation structure that links the two, called a "KESTS" which stands for "Kinetic Energy Supported Transportation Structure;" another name for the transportation structure is the more casual one of "Space Escalator Carousel". Since this structure is intimately involved with the novel's payout, the basic principles of it are described below for those a bit more curious about this technology involved in the adventure.

Why use a KESTS Transportation Structure; and How Would It Work

The actual energy added to payload by having moved it from the ground up into GEO orbit is only 7.3 kilowatt-hours per pound mass lifted up into orbit there. That is about 73 cents per pound, at a rate of 10 cents per KWh of electrical energy.

Compare that with the current cost of over \$10,000 per pound lifted into GEO, as needed by rocket launch vehicles, because they have to lift the weight of a huge amount of fuel for the trip and the tankage to hold all that fuel and the big engines to lift all that weight; but out of all that \$10,000, only 73 cents of it actually gets applied to the payload put into GEO; which is the actual purpose of it all.

Lots of new kinds of great things can be done in GEO, as described more a few pages later here, at anywhere near such low transportation cost of 73 cents per pound; along with sufficiently rapid payload throughput capacity to build the huge facilities up there and maintain them.

The KESTS to GEO transportation structure concept appears to have the potential to provide that function.

Considering our conditioning from watching the spectacular launches of the massive rockets now expensively needed to do even a little bit of putting things into GEO conventionally, probably the value of 73 cents of energy per pound seems way too low, for the energy that is given to payload mass put up into GEO from the ground. So, let's take a quick look at it.

First, we know the energy given has to be less than that given to a mass by giving it "escape velocity", the speed with which launched straight up it will never return. That is about 25,000 mph, 1.12×10^4 m/s. For a pound or 0.454 kg given this velocity, it takes

$E = 0.5 M V^2 = 2.836 \times 10^7$ Joules of kinetic energy which is equal to 7.878 KWh. At an electrical energy cost of 10 cents per KWh, that is 79 cents of energy given to the one pound mass in accelerating it so fast it will never come back (if there were no atmosphere to punch through, of course) and clearly to go into lower orbit it receives less energy than that; so this gives us a calculation check limit.

The energy needed to lift between two different altitudes in a gravitational field is

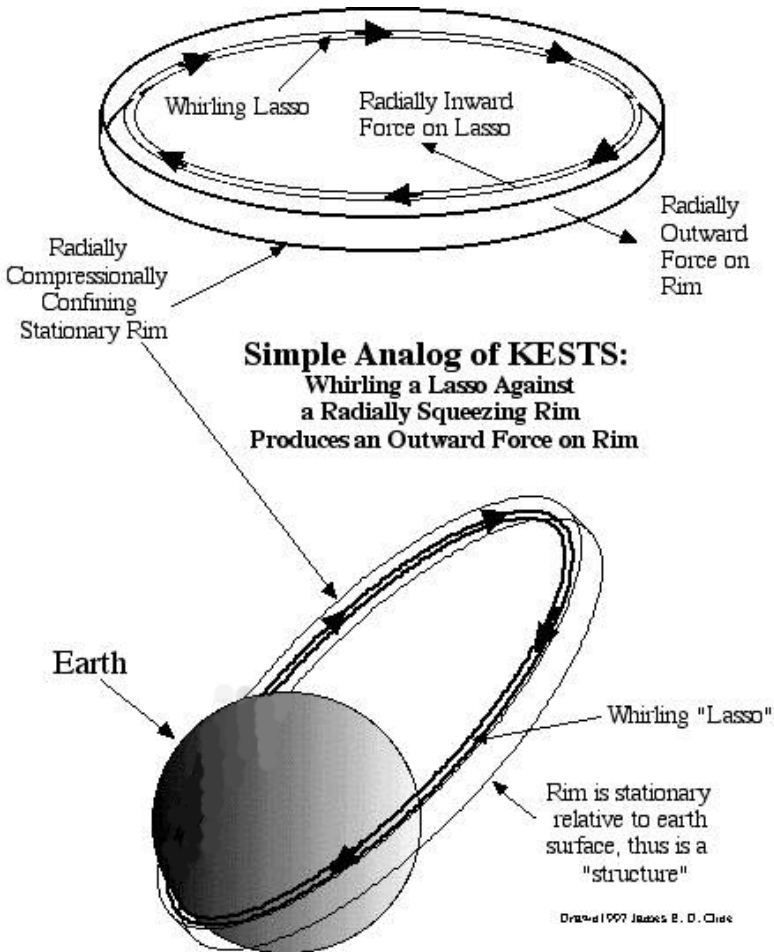
$E = GMm((1/R_0) - (1/R_1))$ where R_0 is the radius of the lower altitude, 6.378×10^6 meters in Earth's case, and R_1 is the radius of Geostationary Earth Orbit 4.23×10^7 meters. That is 14.76 KWh per Kg or 6.71 KWh per pound in the vertical lifting up to GEO altitude; then to

give the mass an orbital velocity of 3.07 Km/s at that altitude, again from $E=0.5MV^2 = 2.14e6$ Joules = 0.594KWh; adding the two energies together = 7.3KWh per pound mass to move it from the ground up into GEO orbit.

Not to be confused with a KESTS, the more familiar "Space Elevator" is a linear anchored tether structure linking the ground with high earth orbital altitudes, is a different kind of way to do such things; but has its own unique set of characteristics that are not as well suited for the massive construction of facilities in GEO as envisioned here, even if there were a sufficiently strong construction material existing for the tether.

The KESTS bypasses that problem with the anchored tether Space Elevator, by instead supporting the weight of a transportation structure through kinetic energy stored within the structure and expressing as structurally distributed outward centrifugal force in opposition to the inward force of gravitational attraction on the mass of the structure and its live loads.

As used in this novel, the KESTS has a variety of potential forms; each having the common characteristics of being a transportation structure in the form of a hoop or band that eccentrically encircles the planet, which has its weight supported by the rapid rate in which its electric motor hoop armature spins along its path around the planet generating outward centrifugal force that balances the inward force of gravity on the overall structure; and also that payload is lifted between ground and orbit by means of electromagnetically braking against the upward-moving part of the armature mass, dragging the payload up to orbit, and similarly gently lowering it back to the ground, possibly returning some of its energy back into the system when returning



(Graphic from a paper titled "KINETIC ENERGY SUPPORTED ELECTRICALLY POWERED TRANSPORTATION STRUCTURES" which the author wrote and presented in May 1997 at the Space Studies Institute's space conference at Princeton, NJ, but was unfortunately rejected for publication at the time.)

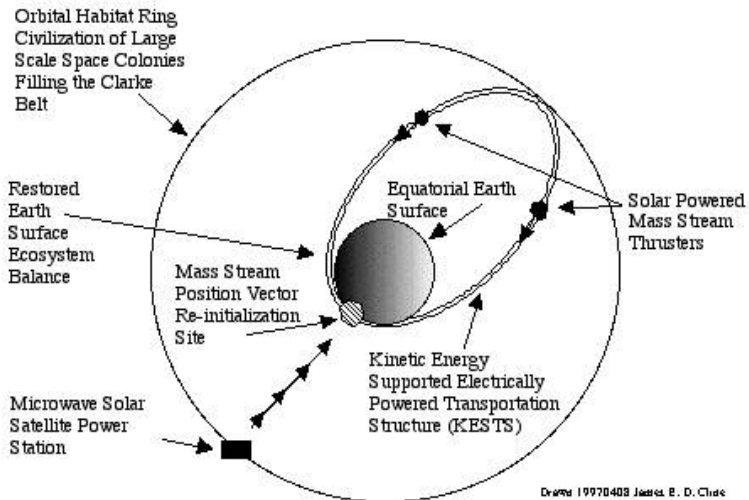
to the ground. This means that the captive spacecraft needs no big rocket engines nor lift heavy fuel for the trips between ground and GEO, enabling great energy efficiency. Again, the energy actually supplied to payload during the lifting is only 15.7 KWhr/kg, 7.3 KWhr per pound mass, about 73 cents of electricity per pound lifted up from the ground into GEO, when starting from somewhere on the equator. Again, compare with the energy given to mass by accelerating it to Earth's escape velocity of 25,000 miles per hour, as launched from the ground if there were no impeding atmosphere; this is 7.9 KWh per pound, and clearly would be somewhat more than is needed to lift merely up into GEO.

The preceding diagram shows the outward centrifugal force on a spinning hoop; and then an elongated version spinning around the earth in the equatorial plane along the approximate path of an Orbital Transfer Trajectory between ground and GEO, the spinning's outward centrifugal force balancing the inward gravitational force on the non-spinning part of the hoop.

A special case of the KESTS is the "Circular KESTS" which spins around the planet in a circular shape, and needs to have access up to it by other means, but once up there, can cruise along at the altitude of the KESTS supported by its above-orbital-velocity constrained path centrifugal force as it goes around the planet. Solid versions of KESTS may be possible too, simpler in design, but of lesser utility than the discontinuous armature mass stream technique mostly used in these descriptions as explored in these fictional adventures.

It is basically a gigantic perimeter synchronous electric motor, built in the general shape of an ellipse that extends around the earth; connecting between the earth surface and GEO. The KESTS internally has high velocity armature mass streams which continuously

travel around the ellipse, riding along magnetic levitation tracks at several times orbital velocity, so that their aggregate outward centrifugal force balances the earthward inward force of gravity on the non-moving part of the ellipse; which is attached to the earth surface at the contact point roughly where an Orbital Transfer Trajectory ellipse would graze the Earth's surface, if there were no atmosphere.



KESTS to an Orbital Habitat Ring Infilling the Clarke Belt

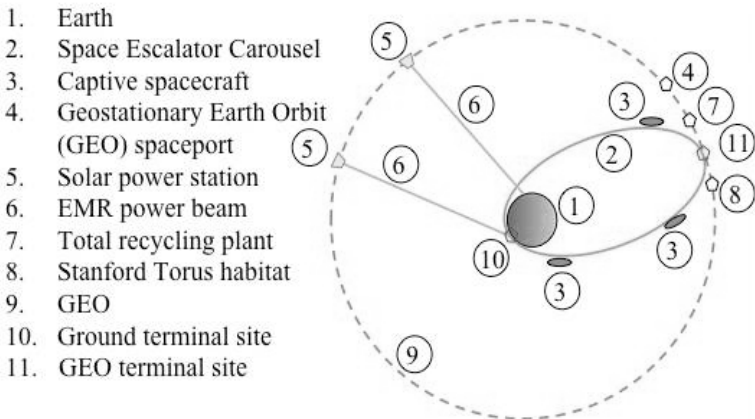
(Graphic from a paper which the author presented in May 1997 at the Space Studies Institute's space conference at Princeton, NJ, but it was rejected for publication at the time)

In this novel, the structural attachment to the earth's surface is primarily within a tunnel in Cayembe Peak in the Ecuadorean Andes Mountains on the earth's equator. The earth-stationary part of the KESTS includes the tubing that keeps a hard vacuum

environment for the armature segments to flow within while traveling within the earth's atmosphere; and also holds a second type of magnetic levitation track on its outside, along which captive spacecraft are lifted up to space by electrodynamicly dragging on the upward-bound armature mass streams until they reach GEO.

Functions of Major Facilities Enabled Built in GEO by Use of KESTS Technology

The following is a diagram showing the KESTS Space Escalator Carousel, showing the Earth in the center, and the Geostationary Earth Orbital ringing it; and some of the major kinds of infrastructure that the KESTS could enable be built and maintained in high earth orbit, as is involved in this novel.



(Graphic from the author's presentation slides used in presenting the technical paper "The Space Escalator Carousel's Unique Potentials" Space Exploration 2005 Conference Proceedings, SESI, 2005, 230-238 at the Space Exploration 2005 conference in Albuquerque, NM in 2005.)

Solar Power Satellites have been proposed for the past four decades to provide abundant clean electrical power to all the nations of the earth, but there has been

no economical means to lift construction materials to build them up there in space, if limited to conventional, rocket propelled launch vehicle means to reach space. The KESTS would finally enable those Solar Power Satellites to be built and maintained up in high earth orbit, GEO. The electrical energy to run the KESTS itself would be beamed down from a Solar Power Satellite in GEO, to the accelerator site on the ground in the mountain tunnel in Ecuador.

The Total Recycling Plant is a second primary kind of facility that probably could be economically built and operated in GEO as enabled by KESTS transportation. These would be gigantic basic mass spectrometer type devices built in the free-fall hard-vacuum GEO environment, that would use solar energy to totally convert toxic and otherwise environmentally-dangerous industrial byproduct material as well as worn out electronics materials and nuclear wastes, back into their basic elemental states. The incoming waste material would be vaporized into a plasma state by focused solar energy; then using electrostatic fields to be separated into positive and negative ions, and accelerated down a pathway to uniform exit speed as they launch across a magnetic field, and the ion's trajectories are bent according to their unique mass-charge ratio, there to be collected in containers placed out around the magnet at the appropriate angles to where the ions were bent by the magnetic field. When the containers are filled, the materials would be utilized for manufacturing up there in GEO, or be returned down the KESTS for industrial re-use in their now pure form; or perhaps in the case of some dangerous radioactive isotopes, being launched into the Sun.

High Spaceports in GEO would be for conventional rocket facilities. Since GEO, already 91% up out of the Earth's planetary gravitational energy well, they would

be extremely energy efficient terminals for spacecraft to travel to and from other destinations in the solar system, including the Moon, Mars, and the moons of the other planets. Starting as cheaply lifted electrically up the KESTS from the ground up into GEO, the spacecraft would have their assembly completed at the spaceports; fueled with fuel brought up the KESTS; and readied for their duties as very large scale manned space exploration expeditions, or for freighting of industrial materials from the Moon and other sources such as asteroids.

The 1 or 2 mile diameter wheel type of city built in space is the last major type of facility involved in this story, much like was envisioned as the 10,000-person space settlement originally designed in 1975 under NASA sponsorship at Stanford, for construction and use in the Earth-Moon Lagrange-5 (L-5) location in space; but adapted here for use in GEO; initial construction from materials brought up the KESTS from the ground, including the water and sawdust for use in making the passive ice shields out of water ice instead of from lunar materials; the water ice would be a benign addition to the earth's atmosphere if and when eons later, the ice shields would be returned to the earth via atmospheric entry.

In the ongoing saga of this novel series, the KESTS was originally built to enable the construction of Solar Power Satellites in GEO to power the earth surface civilization with abundant clean electric power; but by the time KESTS was approved to be built, the whole earth's ecosystem was clearly in collapse mode, so the plan was made to move the earth's population temporarily off-planet into cities built fully around the planet in GEO, while the ecosystem was being jump-started back to long term sustainability. Each city being similar to the wheel-shaped space designs of the mid-

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1970's which would be nearly self-sustaining cities of 10,000 people each; and would instead be passively shielded by water ice that was reinforced by sawdust, and its outside covered by a thin film of aluminum foil to reflect the sun's energy.

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